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Central Coast Field Office

Draft Resource Management Plan Amendment and Draft Environmental Impact Statement for Oil and Gas Leasing and Development

Index No. BLM/CA/PL-2017/001+1610+1675+1793

United States Department of the Interior
Bureau of Land Management, California State Office

December 2016

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Abstract

Lead Agency: U.S. Department of the Interior (DOI), Bureau of Land Management (BLM)

Type of Action: Administrative

Jurisdiction: San Francisco, San Mateo, Santa Cruz, Monterey, San Benito, Santa Clara, Alameda, southern Contra Costa, southwest San Joaquin, western Stanislaus, western Merced, and western Fresno Counties, California

Abstract: The Draft Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS) describe and analyze alternatives for the planning and management of oil and gas development on public lands and split mineral estate lands administered by the BLM, Central Coast Field Office (CCFO). The Planning Area is located in central California, and comprises approximately 6.8 million acres of land. Within the decision area, the BLM administers approximately 284,000 acres of surface estate and 793,000 acres of Federal mineral estate.

Through this RMPA, the BLM is revising the existing Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California (2007) to analyze the effects of alternative oil and gas management approaches on lands with Federal mineral estate. New circumstances and information regarding oil and gas exploration and development, including unconventional reservoirs and well stimulation techniques, have prompted the BLM to prepare this Draft RMPA. As part of the RMPA, the BLM conducted scoping to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed.

To assist the agency decision maker and the public in focusing on appropriate solutions to planning issues, the Draft EIS considers five alternative RMPs.

Alternative A is a continuation of current management (No Action Alternative). Under this alternative, the BLM would continue to manage oil and gas development under the existing RMPs. **Alternative B** would limit the areas open to oil and gas development to lands within oil and gas fields and 0.5-mile buffer areas currently defined by the California Division of Oil, Gas, and Geothermal Resources. Under **Alternative C,** areas of high oil and gas potential or within oil and gas fields and 0.5-mile buffer would remain open. Areas of moderate and low potential and core population areas of the kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills would be closed. **Alternative D** would leave open Federal mineral estate underlying BLM surface estate and close split estate lands; the Ciervo Panoche Natural Area would also be closed. Under **Alternative E,** Federal mineral estate outside of California DWR Bulletin 118 groundwater basins and sub-basins would be open; Federal mineral estate within these groundwater basins and sub-basins would be closed. Under all alternatives, areas closed under the 2007 RMP would remain closed (Wilderness, Wilderness Study Areas (WSAs), Clear Creek Serpentine Area of Critical Environmental Concern (ACEC), and Fort Ord National Monument).

When completed, the ROD for the RMPA will provide comprehensive long-range decisions for managing oil and gas resources in the CCFO. Comments are accepted for 90 days following the date on which the U.S. Environmental Protection Agency publishes the Notice of Availability for this Draft RMPA and EIS in the Federal Register. Comments may be submitted online using the RMPA revision website at: https://www.blm.gov/programs/planning-and-nepa/plans-in-development/california/central-coast-rmp-amendment-for-oil-and-gas or via e-mail to BLM_CA_OGEIS@blm.gov. Comments may also be submitted by mail to: BLM, California State Office, Attn: CCFO O&G Leasing EIS, 2800 Cottage Way, Room W-1623, Sacramento, CA 95825.

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Central Coast Field Office

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United States Department of the Interior
Bureau of Land Management
California State Office

Approved:

Jerome E. Perez, State Director

December 2016

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
California State Office
2800 Cottage Way, Suite W1623
Sacramento, CA 95825
www.blm.gov/ca

December 2016

In reply refer to:
1610-5.G.1.4

Dear Reader:

Attached for your review and comment is the Draft Resource Management Plan Amendment/Draft Environmental Impact Statement (Draft RMPA/EIS) for the Bureau of Land Management (BLM) Central Coast Field Office.[1] The BLM prepared this document in accordance with the National Environmental Policy Act of 1969, as amended, the Federal Land Policy and Management Act of 1976, as amended, implementing regulations, the BLM's Land Use Planning Handbook (H-1601-1), and other applicable law and policy.

The Planning Area consists of about 6.8 million acres of land which includes about 284,000 acres of BLM-administered public lands and about 793,000 acres of Federal mineral estate managed by the Central Coast Field Office. The Central Coast Field Office administers land and mineral resources within an area that encompasses the entirety or portions of twelve counties in north-central coastal California. When approved, this RMPA will amend the 2007 Hollister Field Office RMP for oil and gas leasing and development and will guide the management of public lands and Federal mineral estate administered by the Central Coast Field Office into the future. The Draft RMP A/EIS for Oil and Gas Leasing and Development and supporting information is available on the project web site at: https://www.blm.gov/programs/planning-and-nepa/plans-in-development/california/central-coast-rmp-amendment-for-oil-and-gas.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the Draft RMPA/EIS. We are particularly interested in feedback concerning the adequacy and accuracy of the proposed alternatives, the analysis of their respective management decisions, and any new information that would help the BLM as it develops the plan. In developing the Proposed RMP A/Final EIS, which is the next phase of the planning process, the decision maker may select various management decisions from each of the alternatives analyzed in the Draft RMP A/EIS for the purpose of creating a management strategy that best meets the needs of the resources and values in this area under the BLM multiple use and sustained yield mandate. As a member of the public, your timely comments on the Draft RMP A/EIS for Oil and Gas Leasing and Development will help formulate the Proposed RMPA/Final EIS. Comments will be accepted for ninety (90) calendar days following the Environmental Protection Agency's (EPA) publication of its Notice of Availability in the Federal Register. The BLM can best utilize your com-ments and resource information submissions if received within the review period. Comments may be submitted electronically at: BLM CA OGEIS@blm.gov.

[1] The Hollister Field Office has transitioned to a new location in Marina, California, and is now called the Central Coast Field Office.

Comments may also be submitted by mail to: BLM, California State Office; Attn: CCFO O&G Leasing EIS; 2800 Cottage Way, Room W-1623; Sacramento, CA 95825. To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format.

Your review and comments on the content of this document are critical to the success of this planning effort. If you wish to submit comments on the Draft RMPA/EIS, we request that you make your comments as specific as possible. Comments will be more helpful if they include suggested changes, sources, or methodologies, and reference to a section or page number. Comments containing only opinion or preferences will be considered and included as part of the decision making process, although they will not receive a formal response from the BLM.

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment — including your personal identifying information — may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.
Public meetings to provide an overview of the document, respond to questions, and take public comments will be announced by local media, website, and/or public mailings at least 15 days in advance.

Copies of the Draft RMPA/EIS have been sent to affected Federal, tribal, state and local government agencies. Copies of the Draft RMPA/EIS are available for public inspection on the BLM website at https://www.blm.gov/programs/planning-and-nepa/plans-in-development/california/central-coast-rmp-amendment-for-oil-and-gas. Copies are also available for public inspection at the following BLM locations:

Central Coast Field Office
940 2nd Avenue
Marina, CA 93933-6009

California State Office
2800 Cottage Way, Suite W-1623
Sacramento, CA 95825

Thank you for your continued interest in the Draft RMPA/EIS for Oil and Gas Leasing and Development. We appreciate the information and suggestions you contribute to the planning process. For additional information or clarification regarding this document or the planning process, please contact Melinda Moffitt at (916) 978-4376.

Sincerely,

Jerome E. Perez
California State Director
Bureau of Land Management

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List of Acronyms

AAR	American Association of Railroads
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADSA	Axial dimensional stimulation area
AF	Acre-foot
AFY	Acre-feet per year
AIRFA	American Indian Religious Freedom Act
AML	Abandoned mine lands
AMSCM	Abandoned Mine – Site Cleanup Module
ANSI	American National Standards Institute
APD	Application for Permit to Drill
APEFZA	Alquist-Priolo Earthquake Fault Zoning Act
API	American Petroleum Institute
AQMP	Air quality management plan
AQRV	Air quality related value
ARB	Air Resources Board
ARPA	Archeological Resources Protection Act
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATV	All-terrain vehicle
BAAQMD	Bay Area Air Quality Management District
BAT	Best available technology
BCPs	Based Bird Conservation Plans
BCT	Best conventional pollutant control technology
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMPs	Best management practices
BO	Biological Opinion
BOP	Blowout preventer
BOPE	Blowout prevention equipment
BRM	Bedrock mortar outcrop
BTEX	Benzene, toluene, ethylbenzene and xylene
CAA	Clean Air Act
CalARP	California Accidental Release Prevention
CalEPA	California Environmental Protection Agency
CalOES	Governor's Office of Emergency Services
CalPIF	California Partners In Flight
CAP	Clean air plan
CASGEM	California Statewide Groundwater Elevation Monitoring
CCFO	Central Coast Field Office
CCMA	Clear Creek Management Area
CCR	California Code of Regulations
CCST	California Council on Science and Technology
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Parks and Recreation
CDWR	California Department of Water Resources

CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
CGS	California Geological Survey
CHRIS	California Historic Resources Information System
COA	Condition of Approval
CRPR	California Rare Plant Rank
CSFM	California State Fire Marshal
CSLC	California State Lands Commission
CSU	Controlled Surface Use
CTTM	Comprehensive Travel and Transportation Management
CUPA	Certified Unified Program Agency
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DDW	Division of Drinking Water
DDWEM	Division of Drinking Water and Environmental Management
DHS	Department of Health Services
DOC	Department of Conservation
DOGGR	Division of Oil, Gas, and Geothermal Resources
DOI	Department of the Interior
DPS	Distinct population segment
DSA	Division of the State Architect
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
DWSAP	Drinking Water Source Water Assessment Program
EFH	Essential fish habitat
EHRA	Earthquake Hazards Reduction Act
EIS	Environmental Impact Statement
EO	Executive Order
EOR	Enhanced oil recovery
EPA	Environmental Protection Agency
ERPG	Emergency response planning guidelines
ESA	Endangered Species Act of 1973
ESI	Ecological Site Inventory
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act
FORA	Fort Ord Reuse Authority
FRA	Federal Railroad Administration
GAO	Government Accountability Office
GGRP	Greenhouse Gas Reporting Program
GHG	Greenhouse gas
GIS	Geographic Information System

GLO	Government Land Office
GSA	Groundwater sustainability agency
GSP	Groundwater sustainability plan
GWP	Global warming potential
HAP	Hazardous air pollutant
HAZMAT	Hazardous Materials Management
HCA	High Consequence Area
HCP	Habitat Conservation Plan
HFC	Hydrofluorocarbon
HMR	Hazardous Materials Regulation
HMRR	Hazard Management and Resource Restoration
HSC	Health and Safety Code
HSWA	Hazardous and Solid Waste Act
HUC	Hydrologic Unit Code
HVL	Highly volatile liquid
HWCL	Hazardous Waste Control Law
IDLH	Immediately Dangerous to Life and Health
IM	Instruction Memorandum
IMP	Interim Management Policy
IPCC	Intergovernmental Panel on Climate Change
LBNL	Lawrence Berkeley National Laboratory
LCFS	Low Carbon Fuel Standard
LLNL	Lawrence Livermore National Laboratory
LSAA	Lake or Streambed Alteration Agreement
MA	Management Area
MBTA	Migratory Bird Treaty Act
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCL	Maximum contaminant level
MMBOE	Million barrels of oil equivalents
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRR	Mandatory reporting rule
MSDS	Material Safety Data Sheet
MT	Metric ton
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCCP	Natural community conservation plan
NCP	National Oil and Hazardous Substances Contingency Plan
NCSHPO	National Conference of State Historic Preservation Officers
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NGL	Natural gas liquid
NHPA	National Historic Preservation Act
NHSA	National Historic Sites Act
NHTSA	National Highway Traffic Safety Administration
NIOSH	National Institute for Occupational Safety and Health

NITS	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOI	Notice of Intent
NORM	Naturally occurring radioactive material
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSF	National Science Foundation
NSO	No Surface Occupancy
NSR	New Source Review
NTL	Notice-To-Lessee
NWSR	National Wild and Scenic River
OEHHA	Office of Environmental Health Hazard Assessment
OES	Office of Emergency Services
OHV	Off highway vehicle
OPA	Oil Pollution Act
OPLA	Omnibus Public Lands Management Act
OSHA	Occupational and Safety Health Act
OSHPD	Office of Statewide Health, Planning, and Development
OSPR	Office of Spill Prevention and Response
OSPRA	Oil Spill Prevention and Response Act
PA	Programmatic Agreement
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEIS	Programmatic Environmental Impact Statement
PEL	Permissible exposure limit
PFC	Properly functioning condition
PFYC	Potential Fossil Yield Classification
PGA	Peak Ground Acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	Particulate Matter
PM10	Particulate matter (less than 10 microns in diameter)
PM2.5	Fine particulate matter (less than 2.5 microns in diameter)
PRBO	Point Reyes Bird Observatory
PRC	Public Resources Code
PRPA	Paleontological Resources Preservation Act
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
RMPA	Resource Management Plan Amendment
RNA	Research Natural Area
ROD	Record of Decision
ROG	Reactive organic gases

ROW	Right-of-way
RTE	Rare, threatened, and endangered
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCC	Social Cost of Carbon
SDWA	Safe Drinking Water Act
SEAB	Secretary of Energy Advisory Board
SGMA	Sustainable Groundwater Management Act
SHMA	Seismic Hazards Mapping Act
SHP	Seismic Hazards Program
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARA	Surface Mining and Reclamation Act
SMA	Special Management Area
SN	Sundry Notice
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control and Countermeasures Plan
SPP	Spill Prevention Plan
SSA	Sole Source Aquifer
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TAC	Toxic air contaminant
TCP	Traditional Cultural Property
TDS	Total dissolved solids
TL	Timing Limitation
TMDL	Total maximum daily load
UIC	Underground Injection Control
URIC	Underground Injection Program
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDOT	U.S. Department of Transportation
USDW	Underground Source of Drinking Water
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UVCE	Unconfined vapor cloud explosion
VDECS	Verified Diesel Emissions Control Strategies
VOC	Volatile organic compounds
VRI	Visual resources inventory
VRM	Visual resource management
WDR	Waste Discharge Requirement
WQO	Water quality objective
WSA	Wilderness Study Area
WSR	Wild and Scenic River
ZEV	Zero-emission vehicle

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Executive Summary

Executive Summary

ES.1 Introduction

The Bureau of Land Management (BLM) Central Coast Field Office[1] (CCFO) has prepared this Draft Resource Management Plan Amendment and Environmental Impact Statement (RMPA/EIS) for Oil and Gas Leasing and Development to analyze the effects of alternative oil and gas management approaches on lands with Federal mineral estate within the CCFO Planning Area. The current management decisions for oil and gas resources are described in the Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California.

Resource Management Plans (RMPs) are land use plans that establish goals and objectives for resource management and guide land management actions, which are based on the principles of multiple use and sustained yield. Over time, decisions on how the land is managed need to be revised or amended to respond to new, intensified, or changed uses on public land, prompting an RMP revision or amendment. Here, new circumstances and information regarding oil and gas exploration and development, including unconventional reservoirs and well stimulation techniques, have prompted the BLM to prepare this Draft RMPA to the 2007 Hollister Field Office RMP. To support the preparation of this RMPA, the BLM has completed this Draft EIS that provides a comprehensive evaluation of the environmental issues and impacts associated with the Draft RMPA and alternatives.

ES.2 Planning Area Description

The Planning Area is the geographical boundaries of the CCFO. This includes 6.8 million acres of Federal, State, and private lands across all or portions of the following 12 counties in western-central California:

- Alameda
- Contra Costa
- Fresno
- Merced
- Monterey
- San Benito
- San Francisco
- San Joaquin
- San Mateo
- Santa Clara
- Santa Cruz
- Stanislaus

The CCFO manages public land in 11 of these counties; there are currently no BLM-managed public lands in San Francisco County (see Figure 1-1). Public land parcels vary in size from less than 40 acres to more than 50,000 acres. The most notable holdings are located on the Central Coast at the former Fort Ord military base and in the western San Joaquin Valley.

The Decision Area for the RMPA includes approximately 793,000 acres of BLM-administered subsurface mineral estate underlying public lands or split estate lands within the CCFO Planning Area. Split estate means lands where the surface is owned by an entity or person other than the BLM but the Federal subsurface mineral estate is managed by the BLM. (Onshore Oil and Gas Order No. 1, part II). Split estate leases are included in the Decision Area and would be subject to the oil and gas resource management decisions of the RMPA. "The BLM must comply with NEPA, the National Historic Preservation Act, the Endangered Species Act, and related Federal statutes when authorizing lease operations on split estate lands where the surface is not Federally owned and the oil and gas is Federal." (Onshore Oil and Gas Order No. 1, part VI). The BLM lands at the Coast Dairies are not a part of the Decision Area because BLM does not manage the mineral estate underlying the Coast Diaries.

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[1] The Central Coast Field Office, currently located in Marina, California, was previously called the Hollister Field Office.

ES.3 Overall Vision

The overall vision of the RMPA planning effort is to provide a collaborative community based planning approach to update the existing management decisions and resource allocations for oil and gas leases by addressing new data, changing resource conditions, and changes in the use of public land that have occurred since the 2007 Hollister Field Office RMP was completed. The BLM expects that numerous partners and cooperating agencies will become involved in this process and will assist in providing a variety of data in support of this effort.

ES.4 Purpose and Need for Amending the 2007 Hollister Resource Management Plan

The purpose of this amendment to the 2007 Hollister Field Office RMP is to determine which BLM-managed lands or subsurface Federal minerals are open or closed to oil and gas leasing, and which stipulations or restrictions apply to protect specific resources, based on an analysis of oil and gas exploration and development in excess of levels evaluated in the 2007 RMP. The RMPA would not authorize any actual drilling for exploration or development of oil and gas resources. Actual drilling authorization would be analyzed on a site specific basis dependent on the project specifications before the BLM at that time.

In response to the Hollister litigation and settlement agreement, the BLM developed a new Reasonably Foreseeable Development (RFD) Scenario paying greater attention to the current and future use of well stimulation technologies, including hydraulic fracturing, acid matrix stimulation, and acid fracturing, as well as future uses of enhanced oil recovery (see Appendix B). Because this RFD Scenario forecasts a greater amount of development as compared to the RFD Scenario developed for the 2007 RMP, there is a need to consider whether the land use plan decisions in the 2007 RMP should be adjusted. An RMPA is also needed to address the current and potential future uses of well stimulation technologies, as well as future uses of enhanced oil recovery.

There is also a need to determine appropriate stipulations for the two suspended non-NSO leases referenced in Case No. 11-06174 and the 12 prospective non-NSO leases identified in Case No. 13-01749.[2]

Decisions to be made: Through the RMPA, the BLM will identify which lands are open or closed to oil and gas leasing and which stipulations would be applied on oil and gas exploration and development activities in order to protect environmental resources. For the 14 leases subject to the settlement agreement, the determination will be an implementation-level decision; the implementation decision will determine whether the leases should be issued, and if so, whether the current lease stipulations are sufficient or if additional stipulations are needed.

ES.5 Public Involvement and Agency Cooperation

This document has been prepared with input from interested agencies, organizations, and individuals. Public involvement is a vital component of the Resource Management Planning process and the National Envi-

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[2] The *Center for Biological Diversity v. Bureau of Land Management* (Case No. 11-06174) decision determined that the BLM violated NEPA when it failed to prepare an EIS prior to issuing two non-NSO leases. BLM has agreed to prepare an EIS to analyze and assess the adequacy of proposed stipulations for the non-NSO leases referenced in Case No. 11-06174, and has suspended operations and production on those leases. The BLM has also agreed to not issue and to assess the adequacy of proposed stipulations for 12 prospective non-NSO leases identified in Case No. 13-01749, pending completion of the EIS (*Center for Biological Diversity v. Bureau of Land Management*, 2014).

ronmental Policy Act (NEPA) process for engaging the public in the effort and allowing for full environmental disclosure.

Four public scoping workshops were held in January and February 2014 to initiate the public involvement process for the Central Coast RMPA. BLM's official scoping comment period began August 5, 2013, with the publication of the Notice Of Intent in the Federal Register. The comment period ran for 207 days ending on February 28, 2014, to incorporate the comments received during the public scoping workshops.

Additionally, a social and economic strategies workshop was held to provide an opportunity for local government officials, community leaders, and other citizens to discuss regional economic conditions, trends, and strategies with BLM managers and staff. The workshops assisted in identifying the ways public land resources are integrated into the local economy and way of life and in identifying opportunities for collaborative, stewardship-based management proposals.

Public participation will be ongoing throughout the planning process. The Proposed RMPA/Final EIS will consider all substantive oral and written comments received during the 90-day public comment period for this Draft RMPA/EIS. Members of the public with standing have the opportunity to protest the content of the Proposed RMPA/Final EIS during the specified 30-day protest period. In addition, the public will have the opportunity to comment on implementation level decisions during the 30 days following the release of the Proposed RMPA/Final EIS. A Record of Decision will be issued by the BLM after the release of the Proposed RMPA/Final EIS, the Governor's Consistency Review, and protest resolution.

ES.6 Planning Issues

In its planning process, the BLM uses the concept of issues and unresolved conflicts, as presented in the NEPA regulations. Issues may include demands for resources, as well as concerns and conflicts, associated with balancing a mix of multiple uses, or unresolved conflicts associated with past, present, and future management of public lands or resources. As part of the scoping process, the BLM solicited comments and concerns from the public, organizations, tribes, and Federal, State, and local agencies, as well as from BLM specialists.

The issues identified during scoping were grouped into broad topics and are summarized below.

- **Water Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on water resources? What measures will be implemented to protect these resources?
- **Health and Safety.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on public and worker health and safety? What measures will be implemented to protect the public, workers, and sensitive receptors?
- **Vegetation and Wildlife.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on plants and wildlife? What measures will be implemented to protect these resources?
- **Air Quality.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on air quality? What measures will be implemented to protect air quality?
- **Climate Change.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on climate change and Federal efforts to minimize climate change? What measures will be implemented to minimize contributions to and the impacts of climate change?
- **Geology and Seismicity.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on geology and induced seismicity? What measures will be implemented to protect geology and mitigate for induced seismicity?

- **Soil Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on soil resources? What measures will be implemented to protect soil resources?
- **Socioeconomics.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on the social values and economic revenues of the community? What measures will be implemented to protect these values and revenue sources?
- **Traffic.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on traffic and local roads? What measures will be implemented to protect local roads and manage increased traffic?
- **Tribal and Cultural Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on tribal and cultural resources? What measures will be implemented to protect these resources?
- **Environmental Justice.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on poor, minority, and underrepresented communities? What measures will be implemented to protect these communities from experiencing disproportionate negative effects from oil and gas development?
- **Land Use.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing land uses? What measures will be implemented to protect existing land uses?
- **Livestock Grazing.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing livestock grazing operations? What measures will be implemented to protect these operations?
- **Recreation.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visitor experience and the safety of existing lands and water bodies used for recreation? What measures will be implemented to protect recreational resources?
- **Visual Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visual resources? What measures will be implemented to protect these resources?

Alternative Comments

The following scoping issues were identified by BLM as pertaining to the development of alternatives:

- Cancellation of the 2011 and 2012 Central Coast Field Office lease sales that have been litigated.
- Prohibition on all oil and gas activities in areas managed by the Central Coast Field Office including enhanced oil recovery.
- Prohibition on all oil and gas well stimulation activities (e.g., hydraulic fracturing) in areas managed by the Central Coast Field Office.
- Conditions of approval for new drilling permits to prohibit well stimulation technologies.

General Comments

The following scoping issues were identified by BLM as pertaining to the RMPA/EIS, but were not specific to a particular resource area:

- Address conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) plans and policies.
- Include a list of best management practices (BMPs). Explain the circumstances under which the BMPs would be applied, and how the BLM would ensure that the BMPs would be monitored and enforced.

- Disclose the parties that would be responsible for avoiding, minimizing, and mitigating adverse impacts.
- The impacts analysis should assume that leaks, spills, and human and wildlife contact with fracturing fluid will occur.
- The Reasonably Foreseeable Development Scenario must thoroughly define "reasonably" and "foreseeable."

Issues Discussed at Social and Economic Workshop

- BLM actions under the RMPA.
- Economic and social conditions within the CCFO Planning Area and the regional focus of the social and economic analysis for the RMPA and EIS given the location of Federal mineral estate within the CCFO Planning Area.
- Community characteristics and social and economic concerns from oil and gas development that should be considered in the social analysis for the RMPA and EIS.
- Areas containing low-income and minority populations in the CCFO Planning Area that would most likely be affected by the RMPA.
- Mitigation measures to minimize the impacts associated with the RMPA.

ES.7 Proposed Resource Management Plan Amendment

The BLM used several sources of input to develop alternatives, including existing decisions in the 2007 Hollister Field Office RMP and the 2015 Reasonably Foreseeable Development (RFD) Scenario. The public scoping process, conducted from August 5, 2013, to February 28, 2014, provided an opportunity for interested members of the public, local governments, and other resource and land management agencies to comment on the planning process and/or management concerns for oil and gas resources. From the comments received, the BLM identified the key planning issues to be addressed in the Draft RMPA/EIS and incorporated them into the range of alternatives. BLM also held a Social and Economic Workshop on February 4, 2015, to solicit input on the effects Federal mineral leasing and development may have on local economic and social goals in the CCFO Planning Area, which was documented in a Social and Economic Workshop Summary Report.

The alternatives described in this chapter represent a range of management options to address the issues identified during scoping and to achieve resource management goals in light of the updated oil and gas RFD Scenario in the CCFO Planning Area.

The EIS impact analysis will also address 14 leases within the CCFO Decision Area that do not contain NSO stipulations (i.e., non-NSO leases), per a July 2014 Federal court settlement agreement to resolve the disputes set forth in Case No. 11-06174 and Case No. 13-1749. While BLM will select a Preferred Alternative as part of its plan-level decision for determining which BLM-managed lands or subsurface Federal minerals are open or closed to oil and gas leasing, the determination for the 14 leases will be an implementation-level decision. For each of the 14 leases, the implementation decision will determine whether the leases should be issued, and if so, whether the current stipulations are sufficient or if additional stipulations are needed.

In 2015, the BLM prepared an updated RFD Scenario to project levels and types of industry activity and the associated surface disturbance that are likely to occur on all mineral estate managed by the BLM in the CCFO Planning Area. The 2015 RFD Scenario is based on known or inferred oil and gas occurrence potential based on California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) records, independent assessments of scientific literature, and knowledge of local experts with experience in the leasing and development of Federal minerals. The lands included are lim-

ited to those with BLM-administered minerals, including split estate with surface estate owned by an entity or person other than the BLM and Federal sub-surface minerals. The 2015 RFD Scenario applies to all alternatives.

Overall, the 2015 RFD Scenario assumes that the current development trends in this region are likely to continue for the next 15 to 20 years. It estimates that during the life of this plan, between zero and 32 development wells could be expected on Federal mineral estate within existing fields in the CCFO Planning Area and three to five exploratory wildcat wells (wells outside of DOGGR's administrative boundary of existing oil and gas fields) would be drilled on Federal mineral estate in the CCFO Planning Area. Therefore, given the limited extent of area of Federal mineral estate (793,000 acres) within the entire Planning Area (6.8 million acres), it is unlikely that more than a total of 37 exploratory and development wells will be drilled on new Federal oil and gas leases over the next 15 to 20 years. Well stimulation technologies and enhanced oil recovery techniques are assumed to be used on any or all of these wells.

Table ES-1 shows a summary of the acreages for each of the alternatives described below. Table ES-2 summarizes the leases subject to the settlement agreement by each alternative.

Table ES-1. Acreages of the Alternatives

	Calculated GIS Acres Open with CSU	Calculated GIS Acres Closed	Calculated GIS Acres Open with NSO
Alternative A (No Action)	683,800	67,500	41,700
Alternative B	39,000	754,000	N/A
Alternative C (Preferred)	368,800	394,400	29,800
Alternative D	121,200	655,400	16,400
Alternative E	487,200	99,400	206,400

Table ES-2. Summary of Leases Subject to Settlement by Alternative

	Calculated GIS Acres Open with CSU	Calculated GIS Acres Closed	Calculated GIS Acres Open with NSO
Alternative A (No Action)	17,600	N/A	N/A
Alternative B	3,800	13,800	N/A
Alternative C (Preferred)	17,600	N/A	N/A
Alternative D	4,400	13,200	N/A
Alternative E	10,000	300	7,300

Alternative A. Alternative A would continue current management under the existing 2007 Hollister Field Office RMP (BLM, 2007). All Federal mineral estate would be available for oil and gas leasing, except for designated wilderness, wilderness study areas (WSAs), Fort Ord National Monument, and Clear Creek Serpentine Area of Critical Environmental Concern (ACEC), which are closed under the 2007 Hollister Field Office RMP. NSO stipulations would be applied in ACECs and Recreation and Public Purpose (R&PP) leases. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing.

Under Alternative A, there would be two subalternatives for the leases. Under Subalternative 1, all of the BLM-managed areas (approximately 17,600 acres) that contain the 14 non-NSO leases, as identified in

Case No. 11-06174 and Case No. 13-1749, would be open to leasing. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas of the leases.

Under Subalternative 2, the management decisions for Alternative A would still apply, and the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be open to leasing. However, for analysis purposes, the implementation decision would be: (1) that the two non-NSO leases as identified in Case No. 11-06174 should not have been issued; and (2) to not issue the 12 prospective non-NSO leases as identified in Case No. 13-1749.

Alternative B. Under Alternative B, Federal mineral estate within the boundaries of oil and gas fields, plus a 0.5-mile buffer defined by DOGGR[3] would be available for leasing. Other areas would be closed to oil and gas leasing. Controlled Surface Use (CSU) stipulations would apply to all lands open to leasing. Because of the limited areas open to leasing in this alternative, only up to 32 development wells would be anticipated to be drilled. No exploratory wildcat wells are anticipated.

Under Alternative B, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 3,800 acres would be open with CSU stipulations and 13,800 acres would be closed.

Alternative C. Under Alternative C, unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate would be open to leasing within high oil and gas potential areas or within the boundaries of oil and gas fields, plus a 0.5-mile buffer currently identified by DOGGR, with the exception of core population areas of the giant kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills, which are closed to leasing. CSU stipulations would apply to all lands open to leasing. NSO stipulations would apply to some lands open to leasing, including: (1) threatened and endangered species critical habitat; (2) BLM developed recreation and administrative sites; and (3) special status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, and scenic designations).

Under Alternative C, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 17,600 acres would be open with CSU stipulations.

Alternative D. Under Alternative D, unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate underlying BLM surface estate would be available for leasing. All BLM split estate lands and the Ciervo Panoche Natural Area (both BLM surface and split estate lands) would be closed to leasing. CSU stipulations would apply to all lands open to leasing. NSO stipulations would be applied in ACECs and R&PP leases.

Under Alternative D, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 13,200 acres would be closed and 4,400 acres would be open with CSU stipulations.

Alternative E. Under Alternative E, unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate outside of a California Department of Water Resources Bulletin 118, Groundwater Basin or Sub-basin, would be available for leasing. CSU stipulations would apply to all lands open to leasing. NSO stipulations would apply to some lands open to leasing, including: (1) 12-digit Hydrologic Unit Codes (HUCs) intersecting EPA impaired, perennial surface waters (BLM surface and split estate); (2) 12-digit HUCs intersecting non-impaired, perennial surface waters that intersect split estate; (3) 12-digit HUC subwatersheds with the highest aquatic intactness score; (4) 0.25 miles from non-impaired, perennial surface waters; and (5) 0.25 miles from eligible Wild and Scenic Rivers.

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[3] In the Environmental Impact Report prepared by DOGGR under Senate Bill 4, each oil and gas field includes a buffer area around it within which future activities may occur. Within the CCFO Planning Area, the buffer is 0.5 miles around existing fields. (DOC, 2015 page 5-1)

Under Alternative E, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 10,000 acres would be open with CSU stipulations, 7,300 acres would be open with NSO, and 300 acres would be closed.

Preferred Alternative. Alternative C is the BLM's current Preferred Alternative. This is not a final agency decision, but instead an indication of the agency's preliminary preference. The Proposed RMP may reflect changes or adjustments based on information received during public comment, new information, or changes in BLM policies or priorities. The Proposed RMP may include objectives and actions described in the other analyzed alternatives. For this reason, BLM invites and encourages comments on all alternatives, objectives, and actions described in this Draft RMPA/Draft EIS.

ES.8 Affected Environment

Detailed description of the affected environment within the CCFO Planning Area is presented in Chapter 3 (Affected Environment). The CCFO Planning Area encompasses about 6.8 million acres throughout San Francisco, Contra Costa, San Mateo, Alameda, San Joaquin, Santa Cruz, Santa Clara, Stanislaus, Monterey, San Benito, Merced, and Fresno Counties. Bounded by the Pacific Ocean to the west and the San Joaquin Valley to the east, elevations range from sea level to over 5,000 feet and major landforms include the Diablo Mountain Range, Salinas Valley, and San Joaquin Valley. Public lands are scattered across the Planning Area in numerous small parcels. This is a region of diverse topography and landscapes and extraordinary biodiversity.

Current oil and gas development is concentrated within a limited area of the CCFO Planning Area. In the last decade, nearly all well development occurred in the Coalinga and Jacalitos oil fields (Fresno County), and the San Ardo and Lynch Canyon oil fields (Monterey County). The Federal share of mineral estate in these fields is approximately nine percent (approximately 8,400 acres of Federal mineral estate out of 91,200 total acres), and as such, the BLM administers little of the mineral estate in this area. Likewise, the Vallecitos oil fields located in San Benito County have very little production that occurs on BLM-administered mineral estate. Exploratory oil wells are not common in the CCFO Planning Area, and historically have been drilled on less than five percent of the leases issued on BLM-administered mineral estate.

The biodiversity is reflected by 88 federally listed or candidate species or distinct population segments that occur within the Planning Area, including 46 plants and 42 animals. Critical habitat for 14 animal species and 13 plant species occurs within the Planning Area. There are 197 additional special status species (137 plant and 60 animal species) that occur within the Planning Area, and 129 of these are designated as BLM sensitive species (100 plant and 29 animal species).

There are a number of Special Management Areas within the CCFO Planning Area including two national monuments, two national trails, two research natural areas, and three areas of critical environmental concern. There are also three wilderness areas and five wilderness study areas.

The diverse land area managed by the CCFO encompasses a vast, cultural resource-rich portion of central California containing many hundreds of prehistoric archaeological sites reflecting an occupation of more than 6,000 years and a diversity of site types throughout the interior as well as along the coast. Though few studies have been conducted for land under the jurisdiction of the CCFO, a wealth of archaeological data has been collected from sites in the Southern Santa Clara Valley, the Monterrey Bay area, the south-central coast of California in San Luis Obispo County, and the great Central Valley which largely consists of the western flanks of the San Joaquin Valley. Additionally, the CCFO Planning Area is underlain by many major significant fossil-bearing units.

Significant population growth is forecasted for all twelve counties. Active oil and gas wells on BLM-administered lands account for only 110 (0.6 percent) of the total 18,229 active wells within the CCFO Planning Area, of which BLM administers 793,000 acres of Federal mineral estate out of a total 6.8

million acres. With respect to the mineral extraction industry, Fresno, Monterey, and San Joaquin Counties contain the most active oil and gas wells within the CCFO Planning Area. Those counties, along with Contra Costa, Merced, and Santa Cruz Counties, have seen significant labor earning growth within the mineral extraction industry between years 2001 and 2012. While contributing significant labor earnings, the mineral extraction employment accounts for only a small percentage of the overall employment within each county.

ES.9 Environmental Consequences

Detailed descriptions of impacts of the four action alternatives are provided in Chapter 4 (Environmental Consequences), along with a discussion of the cumulative impacts. The analysis of all alternatives assumes up to 37 wells would be drilled resulting in an estimated 206 acres of ground disturbance.

Implementation of Alternative A would open the greatest number of acres of Federal mineral estate to potential oil and gas development. This alternative provides the most flexibility for oil and gas drilling. It would have the greatest potential for causing localized air quality impacts to sensitive receptors. The alternative could impact the largest number of groundwater basins assigned a high ranking priority and the largest number of watersheds. It is the least protective of biological resources and has the greatest potential for impacts to National Wild and Scenic Rivers.

Implementation of Alternative B would open the fewest acres of Federal mineral estate to potential oil and gas development. It provides the least flexibility for oil and gas drilling and would substantially limit future wildcat wells. It confines impacts to the public due to risk of upset to the smallest area and would likely have the shortest emergency response times. With Alternative E, it would impact the fewest groundwater basins assigned a high ranking priority and watersheds. It would have the potential to be inconsistent with fewer Visual Resource Management Class objectives and would have the least adverse effects to Special Management Areas and negligible impacts to National Wild and Scenic Rivers.

Implementation of Alternative C would balance open and closed acreages of Federal mineral estate, with almost the same amount of each. It provides more flexibility for oil and gas drilling than Alternatives B and D but less than Alternatives A and E. It is the most protective of threatened and endangered species critical habitat. It has the greatest potential for adverse effects to Special Management Areas.

Implementation of Alternative D would open the second fewest acres of Federal mineral estate to potential oil and gas development and would open no split estate lands, limiting the flexibility for oil and gas drilling. It is the most protective of the Ciervo Panoche Natural Area and the special status species found in that region. It has no potential adverse effects from split estate lands but would limit some of the economic benefits of oil and gas development in certain areas.

Implementation of Alternative E would open the second highest number of acres of Federal mineral estate to potential oil and gas development and would prohibit oil and gas leasing inside of a California Department of Water Resources (DWR) Bulletin 118, Groundwater Basin or Sub-basin. It is the most protective for groundwater resources and with Alternative B, would impact the fewest number of watersheds. It has the potential to be inconsistent with the largest number of Visual Resource Management Classes, including Class I, the most protective class.

ES.10 Next Steps

The comment period on this Draft RMPA/EIS will be 90 days following publication of the BLM's Notice of Availability (NOA) in the Federal Register. After comments are received they will be evaluated. Substantive comments could lead to changes in one or more of the alternatives, or in the analysis of environmental consequences. A Proposed RMPA/Final EIS will then be completed and released for a review period. If protests are received on the Proposed RMPA/Final EIS, they will be reviewed and addressed by the Director of the BLM before a Record of Decision and Approved Plan is released.

Chapter 1

Introduction

1. Introduction

The Bureau of Land Management (BLM) Central Coast Field Office[1] (CCFO) has prepared this Draft Resource Management Plan Amendment and Environmental Impact Statement (RMPA/EIS) for Oil and Gas Leasing and Development to analyze the effects of alternative oil and gas management approaches on lands with Federal mineral estate within the CCFO Planning Area. The current management decisions for oil and gas resources are described in the Hollister Field Office Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California (BLM, 2007a).

Resource Management Plans (RMPs) are land use plans that establish goals and objectives for resource management and guide land management actions, which are based on the principles of multiple use and sustained yield. Over time, decisions on how the land is managed need to be revised or amended to respond to new, intensified, or changed uses on public land, prompting an RMP revision or amendment. Here, a court order and settlement agreement, have prompted the BLM to prepare this Draft RMPA to the 2007 Hollister Field Office RMP. The court in *Center for Biological Diversity v. Bureau of Land Management* found it unreasonable for the BLM to "consider only a single exploratory well scenario solely based on past data" based on the record in the case.[2] In settlement of this and a related case, the BLM agreed to prepare an EIS addressing oil and gas development within the CCFO that includes analysis of two non-NSO (no surface occupancy) issued leases and 12 non-NSO prospective leases. In part, the BLM is preparing this EIS to consider impacts that may result from hydraulic fracturing and other well stimulation techniques.[3]

Stimulation, with respect to petroleum production, refers to a range of techniques designed to increase the permeability of the rocks through which oil flows, thereby increasing the production of oil from the reservoir. The most common types of stimulation are hydraulic fracturing, acid fracturing, and matrix acidizing. Since adopting the 2007 Hollister Field Office RMP, the BLM and the State of California have sponsored independent third-party extensive statewide studies of the geology of oil and gas basins and industry activities, including well stimulation treatments, such as hydraulic fracturing, acid matrix stimulation and acid fracturing.[4] These studies improve the understanding of past and present exploration and development in the CCFO Planning Area. An oil reservoir is considered to be unconventional if some type of well stimulation is required to make production economically feasible (CCST, 2014, pg. 48-49). This technology can include techniques that alter reservoir permeability or the fluid viscosity to increase the rate of oil flow from the reservoir to the well (CCST, 2014, pg. 48-49).

The California Council on Science and Technology (CCST) reports are incorporated in this RMPA/EIS by reference. The CCST report *Advanced Well Stimulation Technologies in California* was released in August 2014. This report synthesizes and assesses the available scientific and engineering information associated with well stimulation techniques, including hydraulic fracturing. It includes information on the geol-

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1 The Central Coast Field Office, currently located in Marina, California, was previously called the Hollister Field Office.

2 937 F. Supp. 2d 1140, 1156 (N.D. Cal. 2013).

3 During the scoping period for this RMPA, the BLM received a number of comments from the public expressing concern about potential impacts from hydraulic fracturing (see Section 1.3). Although hydraulic fracturing has been used as a production stimulation method in California since the late 1960s and is considered a standard technique for production, analysis of potential impacts from hydraulic fracturing and other well stimulation techniques is included in this Draft EIS due, in part, to the comments on this issue received during scoping.

4 The California Council on Science and Technology (CCST) released its Independent Scientific Assessment (ISA) on Advanced Well Stimulation Technologies in California, commissioned by BLM, in August 2014 (CCST, 2014). In January 2015, the CCST released Volume I of the State's ISA of Well Stimulation in California, which was required by Senate Bill (SB) 4 (CCST, 2015a). CCST Volumes II and III were released in July 2015.

ogy for oil and gas potential in California with respect to any changes in the potential due to advanced well stimulation techniques (CCST, 2014).

The CCST also released the report *An Independent Scientific Assessment of Well Stimulation in California* in three volumes. The report synthesizes and assesses the available scientific information associated with well stimulation treatments in California including hydraulic fracturing, matrix acidizing, and acid fracturing. Volume 1 "Geology and Well Stimulation Treatments" (January 2015) describes what well stimulation treatments are, how they are conducted and practiced in California, and where they have been and are being used in the State (CCST, 2015a). Volume II "Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations" (July 2015) discusses how well stimulation could affect water, atmosphere, seismic activity, wildlife and vegetation, and human health. Volume II reviews available data, and identifies knowledge gaps and alternative practices that could avoid or mitigate these possible impacts (CCST, 2015b). Volume III "Case Studies of Hydraulic Fracturing and Acid Stimulations in Select Regions: Offshore, Monterey Formation, Los Angeles Basin and San Joaquin Basin" (July 2015) presents four case studies that assess environmental issues and qualitative risks for specific geographic regions: Offshore, Monterey Formation, Los Angeles Basin, and the San Joaquin Basin (CCST, 2015c).

To support the preparation of this RMPA, the BLM is completing an EIS that provides a comprehensive evaluation of the environmental issues and impacts associated with the Draft RMPA and alternatives. The National Environmental Policy Act (NEPA) requires the BLM to consider a range of alternatives in its planning process and to analyze and disclose the potential environmental impacts of proposed RMPA decisions. The alternatives and impact analyses are documented in the EIS. The EIS impact analysis will also address the 14 leases within the CCFO Decision Area that do not contain No Surface Occupancy (NSO) stipulations (i.e., non-NSO leases), per the July 2014 settlement agreement to resolve the disputes set forth in Case No. 11-06174 and Case No. 13-1749.[5]

This RMPA/EIS was prepared using the BLM's planning regulations (43 Code of Federal Regulations [CFR] Part 1600) and guidance issued under the authority of the Federal Land Policy and Management Act (FLPMA) of 1976. Section 102 of the FLPMA sets forth the policy for periodically projecting the present and future use of public lands and their resources through the use of a planning process. Sections 201 and 202 of the FLPMA are the statutory authorities for land use plans prepared by the BLM. The associated EIS is included in this document to meet the requirements of NEPA, the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1500-1508), Department of the Interior (DOI) Implementation of the National Environmental Policy Act of 1969 Final Rule (43 CFR Part 46), and the requirements of BLM's NEPA Handbook H-1790-1 (BLM, 2008) and Land Use Planning Handbook H-1601-1 (BLM, 2005).

In the Federal Register notice initiating this planning process, the BLM indicated it may also use this process to consider amending RMPs for four other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs–South Coast, Mother Lode, and Ukiah Field Offices). The BLM considered public comments from scoping, the results of the CCST reports, and an internal evaluation of the RMPs for these five field offices to determine the proper geographic scope of this RMPA. The Mother Lode and Ukiah field offices were not included in this RMPA because their resources are primarily natural gas with an affected environment and environmental effects that vary substantially from

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[5] The *Center for Biological Diversity v. Bureau of Land Management* (Case No. 11-06174) decision determined that the BLM violated NEPA when it failed to prepare an EIS prior to issuing two non-NSO leases. BLM has agreed to prepare an EIS to analyze and assess the adequacy of proposed stipulations for the two non-NSO leases referenced in Case No. 11-06174, and has suspended operations and production on those leases. The BLM has also agreed to not issue and to assess the adequacy of proposed stipulations for 12 prospective non-NSO leases identified in Case No. 13-01749, pending completion of the EIS (*Center for Biological Diversity v. Bureau of Land Management*, 2014).

the Central Coast Field Office. At the time the court remanded the 2007 Hollister Field Office RMP, the Bakersfield and South Coast RMPs were already under revision. The BLM determined that it was more appropriate to continue with the revised RMPs rather than initiate a new amendment for these plans during the active revision process. Because the Central Coast does have oil development potential, and was not in the midst of a plan revision, the BLM determined that the Central Coast Field Office would be the appropriate geographic scope for this particular RMPA.

1.1 Purpose and Need for Amending the 2007 Hollister Resource Management Plan

The purpose of this amendment to the 2007 Hollister Field Office RMP is to determine which BLM-managed lands or subsurface Federal minerals are open or closed to oil and gas leasing, and which stipulations or restrictions apply to protect specific resources, based on an analysis of oil and gas exploration and development in excess of levels evaluated in the 2007 RMP. The RMPA would not authorize any actual drilling for exploration or development of oil and gas resources. Actual drilling authorization would be analyzed on a site specific basis dependent on the project specifications before the BLM at that time.

In response to the Hollister litigation and settlement agreement, the BLM developed a new Reasonably Foreseeable Development (RFD) Scenario paying greater attention to the current and future use of well stimulation technologies, including hydraulic fracturing, acid matrix stimulation, and acid fracturing, as well as future uses of enhanced oil recovery (see Appendix B). Because this RFD Scenario forecasts a greater amount of development as compared to the RFD Scenario developed for the 2007 RMP, there is a need to consider whether the land use plan decisions in the 2007 RMP should be adjusted. An RMPA is also needed to address the current and potential future uses of well stimulation technologies, as well as future uses of enhanced oil recovery.

There is also a need to determine appropriate stipulations for the two suspended non-NSO leases referenced in Case No. 11-06174 and the 12 prospective non-NSO leases identified in Case No. 13-01749.

Decisions to be made: Through the RMPA, the BLM will identify which lands are open or closed to oil and gas leasing and which stipulations would be applied on oil and gas exploration and development activities in order to protect environmental resources. For the 14 leases subject to the settlement agreement, the determination will be an implementation-level decision; the implementation decision will determine whether the leases should be issued, and if so, whether the current lease stipulations are sufficient or if additional stipulations are needed.

1.2 Planning Area Description

The Planning Area is the geographical boundaries of the CCFO. This includes 6.8 million acres of Federal, State, and private lands across all or portions of the following 12 counties in western-central California:

- Alameda
- Contra Costa
- Fresno
- Merced
- Monterey
- San Benito
- San Francisco
- San Joaquin
- San Mateo
- Santa Clara
- Santa Cruz
- Stanislaus

The CCFO manages public land in 11 of these counties; there are currently no BLM-managed public lands in San Francisco County (see Figure 1-1). Public land parcels vary in size from less than 40 acres to more than 50,000 acres. The most notable holdings are located on the Central Coast at the former Fort Ord military base and in the western San Joaquin Valley.

The Decision Area for the RMPA includes approximately 793,000 acres of BLM-administered subsurface mineral estate underlying public lands or split estate lands within the CCFO Planning Area boundary. Split estate means lands where the surface is owned by an entity or person other than the BLM but the Federal subsurface mineral estate is managed by the BLM. (Onshore Oil and Gas Order No. 1, part II). Split estate leases are included in the Decision Area and would be subject to the oil and gas resource management decisions of the RMPA. "The BLM must comply with NEPA, the National Historic Preservation Act, the Endangered Species Act, and related Federal statutes when authorizing lease operations on split estate lands where the surface is not Federally owned and the oil and gas is Federal." (Onshore Oil and Gas Order No. 1, part VI). (See Appendix G for further details.) The BLM lands at the Coast Dairies are not a part of the Decision Area because BLM does not manage the mineral estate underlying the Coast Dairies.

1.2.1 Area Profile of Oil and Gas Development

Overall, there are five major sedimentary basins in California with reservoirs of known economically viable oil and gas resources: the Los Angeles, Ventura, Santa Maria, Salinas, and San Joaquin Basins. As shown on Figure 1-2 and 1-3, portions of the CCFO Planning Area are within the San Joaquin Basin in San Benito and Fresno Counties and portions of the CCFO Planning Area are within the Salinas Basin in Monterey County. Figure 1-3 shows the plays and active oil and gas wells within the CCFO Planning Area.

Since 2002, well drilling activity in California has largely occurred outside of the CCFO Planning Area. Of the 12 counties in the CCFO Planning Area, six have had some levels of well development activity since 2002 — Alameda, Contra Costa, Fresno, Monterey, San Benito, and Santa Clara. Existing wells are located on BLM-administered mineral estate in Contra Costa, Fresno, Monterey, San Benito, and Santa Cruz Counties. No wells are located on BLM-administered mineral estate in Alameda, Merced, San Francisco, San Joaquin, San Mateo, Santa Clara, or Stanislaus Counties. In general, most of the new well activity in the CCFO Planning Area occurs in the eastern portion of the area (i.e., over 97 percent of all well development since 2002 occurred in four fields in Fresno and Monterey Counties).

As of mid-2014, there are 65 authorized oil and gas leases on Federal mineral estate within the CCFO Decision Area, covering approximately 41,200 acres. Eighty (80) active producing oil and gas and service wells and 66 idle wells are located on Federal mineral estate within the CCFO Decision Area. Over 99 percent of the wells in the CCFO Planning Area are located within oil and gas field boundaries, with less than 1 percent being classified as wildcats (outside administrative field boundaries[6]). Of the total 4,292 producing and service wells within the CCFO Planning Area, the 146 wells that occur on Federal authorized leases amount to BLM involvement with 3.4 percent of all current oil and gas activity within the CCFO Planning Area boundary.

1.2.2 Planning Approach

The BLM uses an ongoing planning process to ensure that land use plans and implementation decisions remain consistent with applicable laws, regulations, orders, and policies. This process involves public participation, assessment, decision-making, implementation, plan monitoring, and evaluation, as well as adjustment through maintenance, amendment, and revision. The planning process also allows for continuous adjustments to respond to new issues and changed circumstances. The BLM will make decisions using the best information available. These decisions may be modified as the BLM acquires new inform-

[6] An oil and gas field is a geographical area under which an oil or gas reservoir lies. Oil and gas field boundaries are defined by the California Division of Oil, Gas and Geothermal Resources (DOGGR). Administrative field boundaries are drawn on section or quarter-section lines and incorporate all producing wells within a field.

ation and knowledge of new circumstances relevant to land and resource values, uses, and environmental concerns. Modifying land use plans through maintenance and amendment on a regular basis reduces the need for major revisions of land use plans (BLM, 2005).

Under FLPMA Section 102, the BLM is required to manage the public lands on the basis of multiple use and sustained yield and to meet the needs of present and future generations. As the planning process can represent a constant balancing of competing needs, interests, and values, the BLM must utilize public outreach efforts to identify concerns raised by both citizens and cooperating/coordinating agencies in the preparation of informed, sustainable land use planning decisions. In addition to the scoping process (see Section 1.3), the BLM conducted a Social and Economic Workshop (held on February 4, 2015). These public meetings have sought to identify attitudes and values relevant to planning issues and alternatives, as well as suggestions regarding sources of data and methods of analysis. By involving the local public in discussions of appropriate data and methods early in the planning process, there is a greater likelihood that the resulting EIS analysis will be useful to the BLM and the public.

Oil and gas leasing and development on Federal mineral estate requires multiple stages of BLM environmental analysis and authorization. Environmental review under NEPA is required at each phase. The RMPA will identify areas as open or closed to fluid mineral leasing and specify appropriate stipulations for those areas identified as open. The environmental review for leasing parcels identifies which parcels should be offered for leasing and the conditions under which leasing and eventual development should occur. The environmental review for the development of leased parcels (including well stimulation techniques) is a site-specific analysis of potential impacts from the proposed project and includes specific conditions of approval to avoid, minimize, or mitigate impacts to sensitive resources.

Leasing

Parcels that are nominated for leasing must be reviewed and approved by the BLM prior to leases being sold at an auction. BLM's Instruction Memorandum No. 2010-117 describes the deliberate, interdisciplinary parcel review process that must occur before a lease sale is held. This review is conducted and documented in accordance with NEPA. The purpose of lease parcel review by the field office is to determine whether a parcel should be offered for leasing, and if so, the conditions under which leasing and eventual development should occur. The CCST reports, and future information developed about oil and gas extraction and well stimulation technology in California, will be used at the leasing stage during the State Director review of parcels to offer for lease. During this review, the BLM will consider the likelihood that the parcels offered for sale will require the use of well stimulation technologies, and disclose the impacts and risks of well stimulation technology based on the best available information at the time, and how those risks can be avoided, minimized or mitigated through the application of Best Management Practices (BMPs) and Conditions of Approval (COAs). Upon completing this review, the State Director will determine whether to offer the parcel for lease, and if so, what stipulations, COAs, and BMPs to attach to the lease.

Development

Onshore Oil and Gas Order Number 1 requires Federal oil and gas operators to conduct operations to minimize impacts to surface and subsurface resources, prevent unnecessary surface disturbance, and conform to currently available technology and practice. Per Onshore Order Number 1, BLM may approve, defer, or deny an Application for Permit to Drill. Drilling and abandonment activities must adhere to the provisions and standards of Onshore Oil and Gas Order Number 2 to protect subsurface resources. Onshore Oil and Gas Order Number 7 provides the methods and approvals necessary to dispose of produced water associated with oil and gas operations.

Measures to avoid, minimize, or mitigate impacts, in addition to those identified in the Onshore Oil and Gas Orders and the regulations in 43 CFR 3160, are incorporated in the Approved RMP as Standard

Operating Procedures (SOPs) and BMPs. Examples of these measures include: reducing the area of disturbance to the smallest practical area and using previously disturbed areas to the extent practicable; setting and cementing surface casings to sufficient depths to protect usable water bearing zones; using a closed-loop drilling system to reduce water usage; and placement of production facilities and equipment to maximize interim reclamation. In addition, every permit approval includes a list of COAs that are tailored to the specific location and type of activity being approved. When the BLM receives applications to conduct activities on leases (e.g., applications for permits to drill or sundry notices of intent), additional NEPA analysis is required. During this site-specific, implementation-level analysis, the BLM may consider additional mitigation measures to address any anticipated impacts, including those from well stimulation techniques. The CCST reports, and future information developed about oil and gas extraction and well stimulation technologies in California, will be used at the development stage to assist the BLM in identifying new BMPs to address the impacts of advanced well stimulation technologies. BLM California will also implement additional policy requirements regarding Applications for Permit to Drill and Sundry Notices as discussed in Instruction Memorandum No. CA-2014-031. As technologies evolve and new information becomes available, the BLM will continue to identify new BMPs to prevent or mitigate the impacts of oil and gas development.

1.2.3 Monitoring, Evaluation, and Adaptive Management

Once the BLM approves a land use plan or amendment, it must monitor and periodically evaluate the land use plan decisions. Land use plan monitoring is the process of (1) tracking the implementation of land use plan decisions (implementation monitoring) and (2) collecting data/information necessary to evaluate the effectiveness of land use planning decisions (effectiveness monitoring)

Evaluation is the process of reviewing the land use plan and the monitoring data to determine whether the land use plan decisions and the NEPA analysis are still valid and whether the plan is being implemented. Land use plans are evaluated to determine if: (1) decisions remain relevant to current issues, (2) decisions are effective in achieving (or making progress toward achieving) desired outcomes, (3) any decisions need to be revised, (4) any decisions need to be dropped from further consideration, and (5) any areas require new decisions.

The BLM's Monitoring and Evaluation process is described in more detail beginning on page 32 of the BLM Land Use Planning Handbook (H-1610-1) (BLM, 2005).

The BLM developed a Reasonably Foreseeable Development (RFD) Scenario to estimate future oil and gas development within the Planning Area. The analysis in Chapter 4 is based, in part, on the RFD Scenario. However, oil and gas leasing and development on Federal mineral estate requires multiple stages of BLM environmental analysis and authorization, as explained in detail in Section 1.2.2.

As part of the implementation of the oil and gas decisions in this amendment, and standard land use planning monitoring and evaluation, the BLM will periodically consider whether planning decisions remain relevant or if the BLM should consider new planning decisions in light of changed circumstances or new information.

1.3 Scoping/Issues

Scoping is the term used in the CEQ regulations implementing NEPA (40 CFR 1500 et seq.) to define the early and open process for determining the scope of issues to be addressed in the planning process. The scoping process serves a number of purposes. It provides an avenue to involve the public in identifying significant issues related to potential land use management actions and helps identify any issues that are not significant and can thereby be eliminated from detailed analysis. Information collected during scoping may also be used to develop the alternatives to be addressed in the NEPA document. The list of stakeholders and other interested parties is also confirmed and augmented during the scoping process.

The formal public scoping period for the RMPA/EIS began on August 5, 2013, with the publication of a Notice of Intent (NOI) in the Federal Register, and ended on February 28, 2014. Four scoping public meetings were held in January and February 2014 in Hollister, Sacramento, Salinas, and Coalinga, California. The BLM reviewed and categorized the public scoping letters and used the planning issues raised in the scoping comments to help guide the development of the range of alternative management strategies for the RMPA. For a detailed description of the scoping process and the public outreach efforts, please refer to the Scoping Summary Report (see Appendix E). BLM also held a Social and Economic Workshop on February 4, 2015, to solicit input on the effects the proposed RMPA may have on local economic and social goals in the CCFO Planning Area, which was documented in a Social and Economic Workshop Summary Report (see Appendix F).

1.3.1 Issues Addressed

In its Scoping Summary Report, the BLM grouped the issues identified during scoping into comments pertaining to specific resource areas, comments pertaining to alternatives, and general comments that were not resource-specific. Additional issues were raised in the Social and Economic Workshop Summary Report as well. The issues identified as being within the scope of the RMPA/EIS are summarized below and included in the Scoping Report and Social and Economic Workshop Summary Report.

Resource Area Comments

- **Water Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on water resources? What measures will be implemented to protect these resources?
- **Health and Safety.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on public and worker health and safety? What measures will be implemented to protect the public, workers, and sensitive receptors?
- **Vegetation and Wildlife.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on plants and wildlife? What measures will be implemented to protect these resources?
- **Air Quality.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on air quality? What measures will be implemented to protect air quality?
- **Climate Change.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on climate change and Federal efforts to minimize climate change? What measures will be implemented to minimize contributions to and the impacts of climate change?
- **Geology and Seismicity.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on geology and induced seismicity? What measures will be implemented to protect geology and mitigate for induced seismicity?
- **Soil Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on soil resources? What measures will be implemented to protect soil resources?
- **Socioeconomics.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on the social values and economic revenues of the community? What measures will be implemented to protect these values and revenue sources?
- **Traffic.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on traffic and local roads? What measures will be implemented to protect local roads and manage increased traffic?

- **Tribal and Cultural Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on tribal and cultural resources? What measures will be implemented to protect these resources?
- **Environmental Justice.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on poor, minority, and underrepresented communities? What measures will be implemented to protect these communities from experiencing disproportionate negative effects from oil and gas development?
- **Land Use.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing land uses? What measures will be implemented to protect existing land uses?
- **Livestock Grazing.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing livestock grazing operations? What measures will be implemented to protect these operations?
- **Recreation.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visitor experience and the safety of existing lands and water bodies used for recreation? What measures will be implemented to protect recreational resources?
- **Visual Resources.** What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visual resources? What measures will be implemented to protect these resources?

Comments on Alternatives

The following scoping issues were identified by BLM as pertaining to the development of alternatives:

- Cancellation of the 2011 and 2012 Central Coast Field Office lease sales that have been litigated.
- Prohibition on all oil and gas activities in areas managed by the Central Coast Field Office.
- Prohibition on all oil and gas well stimulation activities (e.g., hydraulic fracturing) in areas managed by the Central Coast Field Office.
- Conditions of approval for new drilling permits to prohibit well stimulation technologies.

General Comments

The following scoping issues were identified by BLM as pertaining to the RMPA/EIS, but were not specific to a particular resource area:

- Address conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) plans and policies.
- Include a list of best management practices (BMPs). Explain the circumstances under which the BMPs would be applied, and how the BLM would ensure that the BMPs would be monitored and enforced.
- Disclose the parties that would be responsible for avoiding, minimizing, and mitigating adverse impacts.
- The impacts analysis should assume that leaks, spills, and human and wildlife contact with fracturing fluid will occur.
- The Reasonably Foreseeable Development Scenario must thoroughly define "reasonably" and "foreseeable."

Issues Discussed at Social and Economic Workshop

- BLM actions under the RMPA.
- Economic and social conditions within the CCFO Planning Area and the regional focus of the social and economic analysis for the EIS and RMPA given the location of Federal mineral estate within the CCFO Planning Area.
- Community characteristics and social and economic concerns from oil and gas development that should be considered in the social analysis for the EIS and RMPA.
- Areas containing low-income and minority populations in the CCFO Planning Area that would most likely be affected by the RMPA.
- Mitigation measures to minimize the impacts associated with the RMPA.

1.3.2 Issues Considered but Not Further Analyzed

Comments Addressed Through Policy, Regulatory, or Administrative Actions

Policy or administrative actions include those actions that are implemented by the BLM because they are standard operating procedure, because Federal law requires them, or because they are BLM policy. They are issues that are eliminated from detailed analysis in this planning effort. Administrative actions do not require a planning decision to implement because they are a requirement of Federal law or BLM policy. The following issues raised during scoping are already addressed by administrative actions:

- BLM agreed to halt oil and gas leases on Federal land in the CCFO Decision Area, but left unclear whether it would end the moratorium in the future; the moratorium should remain in place.
- BLM should complete the NEPA analysis in as timely and efficient a manner as possible.
- BLM should follow the authority the Congress delegated to Environmental Protection Agency (EPA) and the State of California under the Clean Air Act.
- New wells should be allowed in California's public lands until a Final EIS is completed.
- Identify how areas might be selected as suitable for oil and gas leasing, why and based upon what principles such determinations will be made, and if the information used to make these decisions is consistent with the fundamental issues defined by NEPA.

Comments Not Addressed in the RMPA/EIS

Consistent with the purpose of this action, issues addressed in this RMPA/EIS are those that deal specifically with the effects of alternative oil and gas management approaches on lands with Federal mineral estate within the CCFO Planning Area. Other topics that could be relevant to other planning issues within the CCFO Planning Area are not addressed in this RMPA/EIS. Examples of issues or topics not addressed in this RMPA/EIS include, but are not limited to:

- The EIS and the statewide study should assess the impact of refining and burning the newly accessible supply of oil and gas.
- BLM should conduct an EIS for all BLM-administered lands and sub-surface resources in California, analyzing both its oil and gas leasing practices and the full extent of its associated impacts, rather than limiting the scope to the area under the management of the Central Coast Field Office.
- The alternatives to the project analysis should include a review of the potential for wind and solar power development, including where, how, and with what limitations.

1.4 Planning Criteria

An RMP inventories the natural resources and analyzes the socioeconomic environment associated with a planning area (43 CFR 1610.4-4), while a plan amendment is a modification of one or more parts of an existing RMP (e.g., management of oil and gas resources). In preparing an RMPA, the BLM must: (1) analyze the inventory data and other information available to determine the ability of the planning area to respond to identified issues and opportunities; and (2) prove, consistent with multiple use principles, the basis for formulating reasonable alternatives, including the types of resources to be developed or protected.

The analysis should:

- Describe the current conditions and trends of the resources and the uses/activities in the planning area sufficient to create a framework from which to resolve the planning issues through the development of alternatives;
- Establish indicators or criteria that will be used in evaluating the effects of the alternatives;
- Describe the status (the physical and biological processes that affect ecosystem function; the condition of individual components such as soil, water, vegetation, and wildlife habitat; and the relative value and scarcity of the resources) or present characteristics and condition of the public land; and
- Address social and economic conditions to understand how people, communities, and economies interact with the ecosystem.

Planning criteria help to: (1) streamline the RMPA's preparation and focus; (2) establish standards, analytical techniques, and measures to be used in the process; (3) guide development of the RMPA; (4) guide and direct issue resolution; and (5) identify factors and data to consider in making decisions.

Principles of ecosystem management and a continuing commitment to multiple use and sustained yield will also guide land use decisions in the planning area. The commitment to multiple uses does not mean that all land would be open for all uses. Some uses may be excluded on certain lands to protect specific resource values or uses. Any exclusions, however, would be based on laws or regulations, or be determined through the planning process and subject to public involvement. Planning criteria developed during public scoping will help guide the planning effort (BLM, 2007a).

The planning criteria for this planning effort are that the RMPA will:

- Recognize valid existing rights;
- Retain the existing resource condition goals and objectives in the 2007 Hollister RMP except for Energy and Minerals which have been updated;
- Analyze impacts to areas that are currently open to leasing and will not consider opening areas to leasing that are currently closed;
- Comply with FLPMA, NEPA, and all other Federal laws, executive orders, and management policies for the BLM;
- Seek public input;
- Consider adjoining non-public lands when making management decisions to minimize land use conflicts;
- Consider the planning jurisdictions of other Federal agencies and State, local and tribal governments;
- Develop a reasonable range of alternatives;
- Use current scientific data to evaluate appropriate management strategies; and
- Analyze the socioeconomic effects of alternatives along with the environmental effects.

1.5 Planning Process

When developing or amending an RMP, the BLM uses a nine-step planning process identified in 43 CFR 1600 and the BLM Land Use Planning Handbook (BLM, 2005). The steps in the nine-step planning process are the same for developing a plan amendment as they are for developing an RMP, and are outlined below:

- **Step 1 – Planning Issues Identified.** Issues and concerns are identified through a scoping process that includes the public, Indian tribes, other Federal agencies, and State and local governments.
- **Step 2 – Planning Criteria Development.** Planning criteria are created to ensure decisions are made to address the issues pertinent to the planning effort. Planning criteria are derived from a variety of sources, including applicable laws and regulations, existing management plans, coordination with other agencies' programs, and the results of public and agency scoping. The planning criteria may be updated or changed as planning proceeds.
- **Step 3 – Data and Information Collection.** Data and information for the resources in the planning area are collected based on the planning criteria.
- **Step 4 – Analysis of the Management Situation.** The planning criteria and resource data are used to describe current management (i.e., No Action Alternative) and to identify management opportunities for addressing the planning issues.
- **Step 5 – Alternatives Formulation.** A range of reasonable management alternatives that address issues identified during scoping is developed.
- **Step 6 – Alternatives Assessment.** The estimated environmental effects of each alternative are estimated and analyzed.
- **Step 7 – Preferred Alternative Selection.** The alternative that best resolves planning issues is identified as the preferred alternative.
- **Step 8 – Resource Management Plan Selection.** First, a Draft RMPA/EIS is issued and made available to the public for a review period of 90 calendar days. During this time, the BLM holds another round of public meetings to gather comments and accepts comments in writing. After comments on the draft document are received, the draft is modified as necessary, and the Proposed RMPA/Final EIS is published and made available for public review for 30 calendar days. A ROD is signed to approve the Proposed RMPA/Final EIS.
- **Step 9 – Implementation and Monitoring.** Management measures outlined in the approved plan amendment are implemented, and future monitoring is conducted to test their effectiveness. Changes are made as necessary to achieve the desired results.

1.5.1 Relationship to BLM Policies, Plans, and Programs

This RMPA focuses on the management of oil and gas resources on BLM-administered mineral estate within the CCFO Decision Area. While this RMPA will update the energy and minerals decisions in the CCFO, the existing 2007 Hollister RMP will continue to guide the non-energy related management decisions of public lands within the CCFO Decision Area.

Table 1-1 highlights some of the major plans and policies that have led to the present management of the CCFO Planning Area.

Table 1-1. Existing Management Plans for the Central Coast Field Office

Document Title	Year
BLM Wilderness Recommendations, Central California Study Areas, Final EIS	1987
BLM Wilderness Recommendations, Central California Section 202 WSA, Final EIS	1987
Juan Bautista de Anza National Historic Trail Comprehensive Management Plan/Final EIS	1996
Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California	1997
HFO Fire Management Plan	2004
Southern Diablo Mountain Range and Central Coast California RMP and Final EIS/Record of Decision	2007
Vegetation Management and Herbicide Use Programmatic EIS	2007
Record of Decision for the Clear Creek Management Area RMP	2014

The preceding plans are incorporated in this RMPA/EIS by reference but are not included herein. Additional major plans, policies and programs that apply to BLM land use planning related to oil and gas development and leasing are described below. Other plans, policies and programs that apply to BLM land use planning in general are included in the 2007 RMP.

BLM RMP Amendment for Panoche-Coalinga Area of Critical Environmental Concern

The Panoche-Coalinga ACEC stretches from the Panoche Hills southwards to Coalinga connecting a vast landscape of ancient desert habitats and open space with outstanding scenic and recreational values in the western San Joaquin Valley. The BLM public lands in the region are commonly referred to as the "San Joaquin Desert Hills."

The Record of Decision (ROD) and Approved RMP for the Southern Diablo Mountain Range and Central Coast of California (BLM, 2007a) direct the agency to update the Panoche-Coalinga ACEC Management Plan (BLM, 1987). Therefore, BLM published a Notice of Intent in the Federal Register on September 18, 2012 (77 FR 57579) to address complex natural and cultural resource management issues in southern San Benito and western Fresno Counties.

Preliminary issues for the proposed plan amendment area identified by the BLM and other stakeholders include designation and management of special areas such as ACECs and Research Natural Areas (RNAs), special status species recovery, and lands available for disposal or potential acquisition.

As a result, BLM is considering expanding existing ACEC and RNA designations to existing and acquired public lands. Under the range of alternatives in this Draft EIS, portions of the potential Panoche-Coalinga ACEC expansion would be open to leasing with CSU stipulations, open to leasing with NSO stipulations, or closed to leasing.

BLM Wilderness Recommendations

Wilderness studies were completed for all BLM lands as a requirement under Section 603 of the FLPMA. Wilderness areas are subject to specific management criteria, and their designation cannot be changed except by Congressional action. Within the CCFO Decision Area, the Ventana Wilderness is the only formally classified wilderness area. Additional lands that were classified as Wilderness Study Areas (WSAs) include: Bear Canyon and Bear Mountain WSAs, Panoche Hills North and South WSAs, and San Benito Mountain Research Natural Area (BLM, 2013). Wilderness areas and WSAs were closed to oil and gas leasing under the 2007 HFO RMP and would continue to be closed under all alternatives in the RMPA.

BLM Enjoined Final Rule on Hydraulic Fracturing on Federal and Indian Lands

In March 2015, the BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands.[7] The BLM's hydraulic fracturing rule is intended to reduce risks to resources and the environment.[8] The standards included in the rule update the requirements for well-bore integrity, wastewater disposal, and public disclosure of chemicals, with prior approval of hydraulic fracturing operations. The rule also includes a process to allow states and tribes to request a variance from provisions for which there is a more protective regulation in place, and allows operators to apply for a site specific variance that would meet or exceed the requirements of the rule.

The rule includes the following key components:

- Provisions for ensuring the protection of usable groundwater supplies by requiring a validation of well integrity and strong cement barriers between the wellbore and water zones through which the wellbore passes;
- Increased transparency by requiring companies to publicly disclose chemicals used in hydraulic fracturing to the BLM through the website FracFocus, within 30 days of completing fracturing operations;
- Higher standards for interim storage of recovered waste fluids from hydraulic fracturing to mitigate risks to air, water, and wildlife; and
- Measures to lower the risk of cross-well contamination with chemicals and fluids used in the fracturing operation, by requiring companies to submit more detailed information on the geology, depth, and location of preexisting wells to afford the BLM an opportunity to better evaluate and manage unique site characteristics.

However, on June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule.[9] The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). This rule is referenced throughout this Draft RMPA/Draft EIS and the assumption was that the rule would be in effect. However, the BLM, including the Central Coast Field Office, is not implementing this hydraulic fracturing rule while it continues to be subject to legal challenge. See Section 2.4 for further information regarding BLM's hydraulic fracturing rule.

In accordance with the 2012 Memorandum of Understanding (MOU) between the California State Office, U.S. Bureau of Land Management and the California Department of Conservation, these agencies will coordinate development and implementation of future hydraulic fracturing and cyclic steaming regulations.

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7 That hydraulic fracturing rule has been set aside by the U.S. District Court in Wyoming, and thus the BLM is not implementing it. As explained below, the BLM has appealed that ruling. This footnote applies to all references to BLM's final rule regarding hydraulic fracturing throughout the entire Draft EIS.

8 A recent draft report by the US EPA compared the number of verified adverse incidents involving hydraulic fracturing operations with the total number of the operations. "Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources," (EPA External Review Draft June 5, 2015, available at http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651). It concluded that hydraulic fracturing does not present a widespread systematic risk to drinking water resources. But the threat to resources and the environment is greater than zero; the EPA documented several adverse incidents in several different states outside of California.

9 A separate challenge to the BLM's hydraulic fracturing rule in the U.S. District Court for Colorado has been administratively closed while the parties negotiate.

1.5.2 Collaboration with other Agencies and Groups

Intergovernmental and Interagency

The RMPA will allow the BLM the opportunity to review any agreements that may currently exist with other Federal, State, and local agencies to improve management of public land resources in the Planning Area. These agencies include:

- Alameda Planning Department
- Bay Area Air Quality Management District
- California Department of Conservation
- California Department of Fish and Wildlife
- California Division of Oil, Gas and Geothermal Resources
- California Geological Survey
- California Natural Resources Agency
- California Office of Historic Preservation
- California State Air Resource Control Board
- Central Coast Regional Water Quality Control Board
- Central Valley Regional Water Quality Control Board – Fresno Office
- Los Padres National Forest
- Monterey Bay Unified Air Pollution Control District
- San Francisco Bay Regional Water Quality Control Board
- San Joaquin Valley Air Pollution Control District (Central Office)
- State Water Resources Control Board
- Central Valley Regional Water Quality Control Board – Sacramento Office
- County of Contra Costa
- County of Fresno
- County of Merced
- County of Monterey
- County of San Benito
- County of San Joaquin
- County of San Mateo
- County of Santa Cruz
- County of Santa Clara
- County of Stanislaus
- Department of Toxic Substances Control
- Lawrence Berkeley National Laboratory
- U.S. Army Corps of Engineers
- U.S. Bureau of Reclamation
- U.S. Environmental Protection Agency (EPA), Region 9
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey
- U.S. National Parks Service

Tribal Relationships

The BLM has initiated Section 106 consultation with the 28 tribal individuals, organizations, and federally recognized tribes identified as having interests in the Planning Area. During scoping, the first EIS update was mailed to 28 tribal individuals and organizations (see Appendix E). Of the tribes contacted, the Ohlone/Costanoan-Esselen Nation was the only tribe that indicated a desire for consultation on any planned projects that may adversely impact known or predicted cultural resources and sacred sites within the tribe's aboriginal territory. Government-to-government consultation will continue throughout the RMPA process to ensure that the concerns of tribal groups are considered in development of the RMPA.

1.6 Related Federal, State, and Local Laws and Plans

A broad range of Federal, State and local laws guide development of the RMPA. Key laws with bearing on the planning decisions are discussed below.

National Environmental Policy Act. This legislation established a national policy to maintain conditions under which people and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans. NEPA established the CEQ to coordinate environmental matters at the Federal level and advise the President on such matters. The law requires all Federal actions that could result in a significant impact on the environment to be subject to

review by Federal, tribal, State, and local environmental authorities, as well as affected parties and interested citizens.

Federal Land Policy and Management Act. The FLPMA of 1976 establishes the authority and provides guidance for how public lands are to be managed by the BLM. It defines BLM's mission to manage public lands on the basis of multiple use and sustained yield. The FLPMA requires that the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values be protected. It directs the BLM to develop and revise land use plans as needed for the management of public lands.

In order to implement the FLPMA, the BLM developed a Land Use Planning Handbook (H-1601-1) and NEPA Handbook (H-1790-1) that provide guidance on the requirements of the FLPMA, BLM's Planning Regulations (43 CFR 1600), and NEPA. The handbooks direct the BLM in preparing new RMPs, plan revisions, plan amendments, other equivalent plans (e.g., plans adopted from other agencies), and subsequent implementation-level plans. Procedures and requirements are set forth to ensure that the BLM's plans meet regulatory and statutory requirements. To the extent possible, this guidance integrates land use planning requirements with requirements under NEPA.

Mineral Leasing Act. The Mineral Leasing Act of 1920, as amended, gives the BLM the responsibility for oil and gas leasing on about 564 million acres of BLM, national forest, and other Federal lands, as well as State and private surface lands where mineral rights have been retained by the Federal government. As such, the BLM reviews and approves permits and licenses from companies to explore, develop, and produce oil and gas resources on both Federal and Native American lands. The BLM is also responsible for inspection and enforcement of oil, gas, and other development operations to ensure that lessees and operators comply with the lease requirements and BLM's regulations.

Senate Bill 4. Senate Bill (SB) 4 was passed into law on September 20, 2013, and amended multiple sections of the Public Resources Code and the Water Code of California. SB 4 defines multiple terms used in well stimulation treatment that include hydraulic fracturing and acid well stimulation. SB 4 creates a permitting system and requires operators to comply with public disclosure requirements and neighbor notification. It also builds in water testing and monitoring components for surface and groundwater near the fracturing treatment site.

Clean Air Act. The Federal Clean Air Act (CAA) of 1970, 42 United States Code (USC) 7401 et seq., as amended in 1977 and 1990, including the New Source Review (NSR) facility permitting programs applicable to construction or modification of specified stationary sources, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants promulgated under the authority of the Federal CAA. The U.S. EPA, California Air Resources Board (ARB), and local air districts work together to classify each area as attainment, unclassified, or nonattainment depending on the historical levels of contaminants measured in the ambient air and the history of pollutants occurring at levels that do not attain the standards. Local air districts are responsible for developing an air quality management plan (AQMP) or clean air plan (CAP) where necessary to attain the California air quality standards, while the ARB develops and implements statewide air pollution control plans to achieve and maintain the national air quality standards, known as the State Implementation Plan (SIP).

National Historic Preservation Act. The National Historic Preservation Act (NHPA) is the primary Federal law providing for the protection and preservation of cultural resources. The NHPA established the National Register of Historic Places, the Advisory Council on Historic Preservation, and the State Office of Historic Preservation.

Native American Consultation per Executive Orders 12866, 13084, et seq. Executive Order 13084 establishes requirements for meaningful consultation and collaboration with Indian tribal governments in the development of regulatory practices on Federal matters that significantly or uniquely affect their com-

munities. Executive Order 12866 is intended to enhance planning and coordination with respect to both new and existing regulations and to make the process more accessible and open to the public.

Endangered Species Act. Management activities on private and public lands are subject to the Federal Endangered Species Act of 1973 (ESA), as amended. The ESA directs project proponents or government agencies, as appropriate, to consult with the U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) to address the effects of management activities on threatened and endangered species and designated critical habitats. Consultation leads to the issuance of a Biological Opinion and may result in issuance of a Section 10(a) permit (for non-Federal actions) or a Section 7 permit (for Federal actions) by the USFWS and/or NOAA Fisheries.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) is the domestic law that implements the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. The MBTA decrees that all migratory birds and their parts (including eggs, nests, and feathers) be fully protected. Each of the conventions protects selected species of birds that are common to multiple countries (i.e., they occur in both countries at some point during their annual life cycle). The MBTA is implemented by the USFWS. BLM will be required to manage the bird populations on BLM-administered public lands consistent with the requirements of the MBTA.

Bird Conservation Plans. The Point Reyes Bird Observatory (PRBO) has developed an approach to address bird conservation and habitat issues on a continental scale in cooperation with a voluntary, international coalition known as Partners In Flight. The California Partners In Flight (CalPIF) program has completed six habitat- and bioregion-based Bird Conservation Plans (BCPs) for riparian, oak woodlands, coastal scrub and chaparral, grasslands, coniferous forests, and the Sierra Nevada bioregion. One of the main goals of the CalPIF BCP is to document the health and status of bird populations across the entire state. To this end, the PRBO has developed a database of CalPIF bird monitoring sites and has served as a repository for species breeding-status information for the entire state. Combined with the associated CalPIF study areas database and focal species breeding-status database, these plans provide the foundation for adaptive conservation management in California's habitats (BLM, 2007a).

Anadromous Fish Management. The Interim Management Strategies for Managing Anadromous Fish–Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH, 1995) amended land use plans to include these standards and guidelines for all management activities. The 2007 Hollister Field Office RMP incorporates the PACFISH standards and guidelines, and the RMPA would be consistent with and/or complementary to these strategies.

1.7 Overall Vision

The overall vision of the RMPA planning effort is to provide a collaborative community based planning approach to update the existing management decisions and resource allocations for oil and gas leases by addressing new data, changing resource conditions, and changes in the use of public land that have occurred since the 2007 Hollister Field Office RMP was completed. The BLM expects that numerous partners and cooperating agencies will become involved in this process and will assist in providing a variety of data in support of this effort.

Chapter 2

Alternatives

2. Alternatives

2.1 Introduction

Chapter 2 describes the five alternatives evaluated in detail in the Central Coast Oil and Gas Leasing and Development Resource Management Plan Amendment (RMPA)/Environmental Impact Statement (EIS), which includes the No Action Alternative (Alternative A) and four action alternatives (Alternatives B, C, D, and E). Section 2.2 explains how the alternatives were developed. Sections 2.3 and 2.4 describe the Reasonably Foreseeable Development (RFD) Scenario as well as management goals, objectives and actions common to all alternatives. The five alternatives are described in Sections 2.5 through 2.10 and are depicted on figures provided in Appendix A. Section 2.11 presents a detailed comparison of the five alternatives. Finally, the alternatives that were considered but eliminated from detailed analysis are described in Section 2.12. Alternatives were eliminated if they did not meet the purpose and need for the Draft RMPA/EIS, were covered under alternatives analyzed in this RMPA/EIS, or if they were not feasible due to technical, legal, or policy considerations.

In this EIS, the BLM has developed and assessed reasonable alternatives that meet the purpose and need identified in Chapter 1. During this process, the BLM explored and objectively evaluated reasonable alternatives, and according to 40 CFR Part 1502.14(a), explained why certain alternatives were eliminated from detailed study. It is the BLM's position that the alternatives presented use sound and prudent judgment and are feasible from a technical and economic standpoint. In addition to the action alternatives, 40 CFR Part 1502.14(d) directs Federal agencies to include a No Action Alternative. The No Action Alternative is the only alternative that does not need to respond to the purpose and need for the action. Alternatives are not management decisions; alternatives represent a reasonable approach to manage resources and resource uses. The action alternatives presented in this EIS reflect a range of development and management use, and resource protections. The alternatives are responsive to issues identified during the scoping period to meet established planning criteria (outlined in Chapter 1) and provide resource management goals and objectives. All alternatives are intended to minimize adverse impacts on physical, biological, and socioeconomic resources from oil and gas development while providing for a level of resource use and development consistent with current laws, regulations, and BLM policies.

Analysis of each alternative has been reviewed and has guided the BLM in selecting Alternative C as the Preferred Alternative (40 CFR Part 1502.14 (e)). This is not a final agency decision, but instead an indication of the agency's preliminary preference. As part of the planning process, the public is invited to comment on this Draft RMPA/EIS. The Proposed RMP may reflect changes or adjustments based on information received during public comment, new information, or changes in BLM policies or priorities. The Proposed RMP may include objectives and actions described in the other analyzed alternatives. For this reason, BLM invites and encourages comments on all alternatives, objectives, and actions described in this Draft RMP/Draft EIS. When commenting on this draft document, the reader may choose to address entire alternatives only or various elements of any of the alternatives. The BLM will consider all substantive comments received, and prepare a Proposed RMPA and Final EIS, followed by the Approved RMPA and Record of Decision (ROD). The ROD will contain the decisions that will guide future management of energy and minerals administered by the Central Coast Field Office (CCFO).

Acreages presented for each alternative have been calculated using BLM Geographic Information System (GIS) data; the results may differ from the 2007 RFD Scenario due to advancement of GIS technology, refinement in the precision of the mapping of various datasets over time, variations in the selection of data sets utilized for calculations, and refinement of the oil and gas occurrence potential in the CCFO Planning Area. Mineral estate lands managed by BLM are also subject to change due to acquisitions and/or disposal and data refinement and maintenance. Total calculated acres do not represent site specific areas and are for generalized planning purposes only.

2.2 Alternatives Development

The BLM used several sources of input to develop alternatives, including existing decisions in the 2007 Hollister Field Office RMP and the 2015 RFD Scenario. The public scoping process, conducted from August 5, 2013, to February 28, 2014, provided an opportunity for interested members of the public, local governments, and other resource and land management agencies to comment on the planning process and/or management concerns for oil and gas resources. From the comments received, the BLM identified the key planning issues to be addressed in the Draft RMPA/EIS and incorporated them into the range of alternatives. BLM also held a Social and Economic Workshop on February 4, 2015, to solicit input on the effects Federal mineral leasing and development may have on local economic and social goals in the CCFO Planning Area, which was documented in a Social and Economic Workshop Summary Report (Appendix F).

2.3 Reasonably Foreseeable Development Scenario

In 2015, the BLM prepared an updated RFD Scenario to project the levels and types of industry activity and the associated surface disturbance that are likely to occur on all mineral estate managed by the BLM in the CCFO Planning Area (see Appendix B). The 2015 RFD Scenario is based on known or inferred oil and gas occurrence potential based on California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) records, independent assessments of scientific literature, and knowledge of local experts with experience in the leasing and development of Federal minerals. The lands included are limited to those with BLM-administered mineral estate, including split estate where the surface is owned by an entity or person other than the BLM but the Federal subsurface mineral estate is managed by the BLM. The 2015 RFD is a planning tool to help the BLM project the reasonably foreseeable impacts of oil and gas development within the Planning Area. It does not, in and of itself, represent a decision to authorize oil and gas development, nor is it a goal or target for oil and gas development in the Planning Area. Therefore, it is used to analyze the impacts of all alternatives, including the No Action Alternative.

An RFD is used to project management activities and actions which are likely to occur in the planning area over the life of the plan assuming all potentially productive areas are open under standard lease terms and conditions. (BLM Handbook, H-1624-1 Planning for Fluid Mineral Resources, Chp. III.; Instruction Memorandum No. 2004-089 "Policy for Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas," January 16, 2004.) Existing fluid minerals practices, including well stimulation techniques and enhanced recovery methods, and information on existing leases and related exploration and development activities as well as the potential for development in the planning area provides the basis for projecting the RFD. The RFD should address areas with similar exploration and development potential, the number, density and type of wells likely to be drilled within these areas, and the estimated percent of activity that is likely to occur on land managed by the BLM. Projections should be based on past and present leasing, exploration, and development activity as well as professional judgment on geological and related technological and economic factors. Extrapolation of historical drilling and/or production activity may be used as the basis for projections. The location of reserves, including those in existing fields/pools that may be developed by secondary or other enhanced recovery methods should also be taken into consideration. In frontier areas this analysis may not be possible due to lack of drilling or production data. Once an RFD is completed, the agency is in a position to analyze the potential direct, indirect and cumulative impacts assuming continuation of existing management practices. An RFD is not a planning decision nor the No Action Alternative. "Reasonably foreseeable development" does not include scenarios that are merely speculative or only have a remote possibility of occurring.

In response to the Hollister litigation the BLM has specifically identified the potential use of enhanced production and well stimulation techniques in re-addressing the RFD for the Central Coast RMP. The 2015 RFD Scenario considers oil and gas technologies, including well stimulation, enhanced oil recovery

techniques, and recent oil and gas development trends in California. Based on further analysis of the geology of the area and updated information, the 2015 RFD Scenario also modifies the areas of oil and gas occurrence potential that were identified in the RFD Scenario for the 2007 Hollister Field Office RMP (BLM, 2007; Appendix F).

Overall, the 2015 RFD Scenario assumes that the current development trends in this region are likely to continue for the next 15 to 20 years. Fewer than one percent of the wells counted in the CCFO Planning Area occur outside of existing administrative oil and gas field boundaries.[1] The RFD estimates that during the life of this plan, between zero and 32 development wells could be expected on Federal mineral estate within existing fields[2] in the CCFO Decision Area and three to five exploratory wildcat wells[3] (wells outside of the administrative boundary of existing oil and gas fields) would be drilled on Federal mineral estate in the CCFO Decision Area. Therefore, given the limited extent of area of Federal mineral estate within the entire Planning Area (approximately 793,000 acres of Federal mineral estate out of 6.8 million acres in the Planning Area), it is unlikely that more than a total of 37 exploratory and development wells will be drilled on new Federal oil and gas leases over the next 15 to 20 years. Well stimulation technologies and enhanced oil recovery techniques are assumed to be used on any or all of these wells (Appendix B); however, since 2002, only 2.5 percent of the wells within the CCFO Planning Area boundaries have record of being hydraulically fractured. While the large majority or even all of this activity is expected to occur in areas identified in this RFD Scenario as "high oil and gas occurrence potential," there is always a possibility that Federal minerals in other areas may see geophysical exploration, leasing, and even actual exploration and development drilling. It is highly unlikely, although not impossible, that any wells in such an area would be productive, so any associated surface disturbance would likely be short-term. The total surface disturbance caused by all seismic operations, exploration drilling, and well development on Federal mineral estate would be up to approximately 206 acres (see Appendix B, sec. 5). For the purposes of this RMPA/EIS, all mineral estate managed by the BLM is considered covered by the 2015 RFD Scenario, even if not currently mapped. Mineral estate on lands that may be acquired in the future is also to be covered by the 2015 RFD Scenario, so long as the values and resources that are contained on the newly acquired lands do not differ significantly from other Federal mineral estate nearby.

2.4 Management Common to All Alternatives

The alternatives described in this chapter represent a range of management options to address the scoping issues (presented in Section 1.3) and to achieve resource management goals in light of the updated oil and gas RFD Scenario in the CCFO Planning Area, which includes updated information based on oil and gas drilling technologies, including well stimulation, and recent oil and gas development trends in California. This section discusses the management goals, objectives, and actions that would apply to CCFO management of oil and gas resources under all alternatives, as well as Best Management Practices (BMPs) and BLM's final rule on hydraulic fracturing (BLM, 2015a). The specific goals, objectives and management

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1 An oil and gas field is a geographical area under which an oil or gas reservoir lies. Oil and gas field boundaries are defined by the California Division of Oil, Gas and Geothermal Resources (DOGGR). Administrative field boundaries are drawn on section or quarter-section lines and incorporate all producing wells within a field.

2 The RFD assumes that the federal share of development is likely to remain roughly proportional to the federal share of mineral estate in the four most-active fields (1 percent).

3 The past trend indicating only one percent of wells are outside administrative field boundaries implies that roughly 32 exploratory wells would be drilled on lands within the CCFO Planning Area. Given that 11.6 percent of land in the planning area is federal mineral estate, 3 to 5 exploratory wildcat wells would be drilled on Federal mineral estate in the CCFO Planning Area during the life of this plan.

actions that would apply to CCFO management of oil and gas resources under each individual alternative are listed in Sections 2.6 through 2.10.

All areas currently closed to leasing under the 2007 Hollister Field Office RMP would remain closed under all alternatives.

2.4.1 Management Goals and Objectives

Management goals are typically focused on maintaining, improving, and enhancing existing resource conditions, avoiding adverse impacts, and complying with applicable State and Federal standards and regulations. Establishing management goals aids the BLM in developing management objectives, allowable uses, and management actions. Management goals are broad statements of desired outcome, but are generally not measurable. Objectives are anticipated to achieve the stated management goals. Management objectives provide a guideline for developing management actions. Objectives are usually quantifiable and measureable, and may have established timeframes for achievement.

The 2007 HFO RMP defined management goals and objectives for each resource and resource use category that the BLM must address in the planning process (BLM, 2007). These management goals and objectives have been incorporated as applicable and updated to apply to this oil and gas leasing under this RMPA/EIS as follow.

The goal for energy and mineral resource management is to allow development of energy and mineral resources to meet the demand for energy and mineral production while protecting natural and cultural resources in the area.

To achieve this goal, the following objectives related to oil and gas leasing and development would be established:

- Balance responsible mineral resource development with the protection of other resource values;
- Provide opportunities for mineral exploration and development under the mining and mineral leasing laws; and
- Provide mineral materials needed for community and economic purposes.

2.4.2 Management Actions

Management actions are intended to achieve desired outcomes. These actions include proactive measures or limitations intended to guide day-to-day activities occurring on public land. For this EIS, public land includes land managed by the BLM and Federal mineral estate land. BLM management actions for energy and minerals that are common to all alternatives are listed below. Sections 2.6 through 2.10 list management actions that would be implemented for each action alternative.

In order to manage oil and gas leasing and development within the CCFO Planning Area, the BLM established the following management actions in the 2007 RMP:

- **ENERG-COM1.** As outlined in the Interim Management Policy for Lands Under Wilderness Review (BLM, 2012) and the Wilderness Act of 1964, WSAs and Wilderness Areas would be closed to mineral leasing and sales and to locatable mineral activities that require reclamation or degrade wilderness values.
- **ENERG-COM4.** Make all BLM public lands, unless withdrawn or otherwise noted, available for energy and mineral development subject to BLM's Fluid Minerals BMPs.
- **ENERG-COM5.** Consider energy and minerals exploration, development, and production within environmental and multiple-use management constraints.

- **ENERG-C4.** Leases would be subject to standard stipulations and mitigation measures for special status species (BLM, 2007; Appendix D).

As part of establishing the Fort Ord National Monument in 2012, the presidential proclamation withdrew Fort Ord from mineral entry. As such, the following new management action common to all alternatives would also be established in addition to those established in the 2007 RMP:

- **ENERG-A1.** Fort Ord National Monument would be closed to mineral leasing.

2.4.3 Best Management Practices

Best Management Practices (BMPs) are measures applied to oil and natural gas drilling and production to help ensure that energy development is conducted in an environmentally responsible manner. BLM issued a BMP policy on June 22, 2004. The policy instructs field offices to incorporate appropriate BMPs into Applications for Permit to Drill as Conditions of Approval and associated on- and off-lease rights-of-way approvals. BMPs are dynamic, evolving through new understanding and developments in science and technology. They are selected and implemented as necessary, based on site-specific conditions, to meet resource objectives for specific management actions. New information and improving technologies will likely lead to the development of new or revised measures over time. Some BMPs are as simple as choosing a paint color that helps oil and gas equipment blend in with the natural surroundings, while others involve cutting-edge monitoring and production technologies. All are based on the idea that the "footprint" of energy development should be as small and as light as possible (BLM, 2015b). For all alternatives, the BLM would apply and use BMPs (see Appendix D), as needed in specific situations, to ensure adequate protection of resource values. "BMPs are voluntary unless they have been analyzed as a mitigation measure in the environmental review for a Master Development Plan, Application for Permit to Drill (APD), Right-of-Way, or other related facility and included as a Condition of Approval" (43 CFR 3164.1, Onshore Oil and Gas Order No. 1, Approval of Operations [2007]).

By reducing the area of disturbance, adjusting the location of facilities, and using numerous other techniques to minimize environmental effects, BMPs reduce impacts associated with new energy development to wildlife habitat, scenic quality, water quality, recreation opportunities, and other resources. The actual practices and mitigation measures best for a particular site are evaluated through the NEPA process in this EIS and vary to accommodate unique, site-specific conditions and local resource conditions.

BMPs could be applied as a Condition of Approval (COA) at the time of permitting of oil and gas drilling or related operations or other activities and could include a variety of measures to minimize impacts over the short- or long-term, including timing limitations or avoidance areas for land use authorizations.

2.4.4 BLM Final Rule on Hydraulic Fracturing on Federal and Indian Lands

In March 2015, the BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands.[4] The BLM's hydraulic fracturing rule is intended to reduce risks to resources and the environment.[5] The

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[4] That hydraulic fracturing rule has been set aside by the U.S. District Court in Wyoming, and thus the BLM is not implementing it. As explained below, the BLM has appealed that ruling. This footnote applies to all references to BLM's final rule regarding hydraulic fracturing throughout the entire Draft EIS.

[5] A recent draft report by the US EPA compared the number of verified adverse incidents involving hydraulic fracturing operations with the total number of the operations. "Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources," (EPA External Review Draft June 5, 2015, available at http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651). It concluded that hydraulic fracturing does not present a widespread systematic risk to drinking water resources. But the threat to resources and the environment is greater than zero; the EPA documented several adverse incidents in several different states outside of California.

standards included in the rule update the requirements for well-bore integrity, wastewater disposal, and public disclosure of chemicals, with prior approval of hydraulic fracturing operations. The new final rule would fill gaps in the existing BLM requirements for hydraulic fracturing operations on Federal and Indian lands, by requiring prior BLM approval for all hydraulic fracturing operations, verification and testing of cement and casing strength, submission of information about the chemicals used in hydraulic fracturing operations, requirements for safe temporary storage of recovered fluids, and information to help prevent unplanned surges of pressurized fluids into other wells ("frack hits"). The rule also includes a process to allow states and tribes to request a variance from provisions for which there is an equal or more protective regulation in place, and allows operators to apply for a site specific variance that would meet or exceed the requirements of the rule.

However, on June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule.[6] The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). This rule is referenced throughout this Draft RMPA/Draft EIS and the assumption was that the rule would be in effect. However, the BLM, including the Central Coast Field Office, is not implementing this hydraulic fracturing rule while it continues to be subject to legal challenge. The outcome of the court action could be that the rule is (1) upheld in entirety, (2) overturned in entirety, or (3) upheld in part while other parts are overturned. If the final judgment of the Federal courts overturns any of the specific provisions of the BLM's hydraulic fracturing rule that specific provision would not be implemented by the BLM. Chapter 4 (Environmental Consequences) distinguishes potential impacts with and without implementation of the BLM's rule.

On public lands, including those covered by the RMPA, oil and gas operators must comply with both Federal and State statutes and regulations to the extent that State regulations do not contradict Federal law or interfere with Federal lease rights. In California, the relevant State law includes hydraulic fracturing regulations promulgated under California's Senate Bill 4 (SB 4).[7] As discussed below, SB 4 provides for reductions in the risks present with hydraulic fracturing operations. SB 4 addresses well stimulation requirements, including hydraulic fracturing requirements, as does the Federal hydraulic fracturing rule (See Table 2-1). In addition, all action alternatives include a protection of water stipulation, Controlled Surface Use – Well Stimulation Technologies.

BLM's Instruction Memorandum (IM) No. CA-2014-031 supplements existing BLM policy and guidance regarding APDs and Sundry Notices (SNs) in California. That IM provides an opportunity for BLM California to coordinate data requirements with those of the State of California with respect to well stimulation techniques, including hydraulic fracturing, that it regulates pursuant to SB 4. According to the IM, before an operator may conduct well stimulation activities on Federal mineral estate, a copy of the State permit application and groundwater monitoring plan (if applicable) required by SB 4 is to be submitted to the BLM along with the APD or SN. The operator should also follow up with copies of the final State-approved permits that show any modifications to the original application. The information contained in the application and the final State-approved permit will be used to inform the BLM's NEPA analysis regarding the effects of well stimulation. This information is comparable, in part, to some of the pre-operation information requirements under the BLM's hydraulic fracturing rule, which will also inform BLM's NEPA analysis. BLM's NEPA analysis will provide the basis for modification or application of conditions of approval regarding the proposed operation. Likewise, the BLM California's protection of water stipulation affords mitigation measures for surface and groundwaters that complement

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6 A separate challenge to the BLM's hydraulic fracturing rule in the U.S. District Court for Colorado has been administratively closed while the parties negotiate.

7 The final regulations promulgated under SB 4 amend sections of California Code of Regulations Title 14, Division 2, Chapter 4, Subchapter 2.

the requirements in IM CA-2014-031. The stipulation provides that in areas where well stimulation is probable, APDs will not be approved until the BLM receives sufficient information on proposed or anticipated site-specific well stimulation activities and an associated plan to monitor and mitigate for impacts to ground and surface water resources. These requirements may be satisfied by providing the BLM information required by SB 4.

BLM California's 2012 Memorandum of Understanding with the California Department of Conservation encourages and facilitates sharing information and combining resources where possible. BLM California and the State of California have agreed to cooperatively implement oil and gas field regulations on Federal mineral estate.

To compare and contrast the BLM's hydraulic fracturing rule with SB 4, a summary of each is provided in Table 2-1.

Table 2-1. Comparison of BLM's Hydraulic Fracturing Rule and Senate Bill 4

Subject	BLM Hydraulic Fracturing Rule	California SB 4 Regulations
Covered operations	Rules only apply to hydraulic fracturing.	Rules apply to hydraulic fracturing and any other well stimulation treatment designed to enhance the permeability of the formation. Data collected regarding all uses of acid and significant pressures applied to the well.
Permit application requirements	Information must be provided regarding the treatment design, the surrounding geology, known faults in the area of the treatment, and other wells in the area of the treatment. Application must demonstrate that all usable water and other mineral-bearing formations will be isolated and protected from contamination.	Information must be provided regarding the treatment design, the surrounding geology, known faults in the area of the treatment, and other wells in the area of the treatment. Application must demonstrate that there will be geologic and hydrologic isolation of the oil and gas formation during and following treatment.
Permit grouping	Procedures exist for submitting permits in batches, but each individual permit is still subject to equal scrutiny.	Procedures exist for submitting permits in batches, but each individual permit is still subject to equal scrutiny.
Neighbor notification	None required.	The operator must notify neighboring surface property owners and provide them with a copy of the approved treatment permit at least 30 days before treatment is commenced. At the property owner's request, the operator must pay for testing of water wells or surface water before and after treatment.
Groundwater monitoring	None required.	Groundwater monitoring must be done on a well-specific, field-wide, or regional basis. Groundwater monitoring plans are subject to review and approval by the State Water Resources Control Board.
Pressure testing of well prior to treatment	The well must be pressure tested to at least 100% of the maximum surface pressure anticipated during treatment. Pressure must hold for at least 30 minutes with no more than 10% pressure loss.	The well must be pressure tested to at least 100% of the maximum surface pressure anticipated during treatment. Pressure must hold for at least 30 minutes with no more than 10% pressure change. The Division must be provided opportunity to witness pressure testing.

Table 2-1. Comparison of BLM's Hydraulic Fracturing Rule and Senate Bill 4

Subject	BLM Hydraulic Fracturing Rule	California SB 4 Regulations
Pressure testing of surface equipment prior to treatment	None required.	Surface equipment must be pressure tested at a pressure equal to 125% of the maximum surface pressure anticipated during treatment, but not greater than the manufacturer's pressure rating for the equipment being tested.
Cement evaluation	Cement evaluation must be done to demonstrate that cement will ensure isolation and protection of usable water.	Cement evaluation must be done to demonstrate that cement will ensure the geologic and hydrologic isolation of the oil and gas formation during and after treatment.
Monitoring during treatment	Pressures must be monitored and recorded during treatment. If pressure increases by more than 500 pounds per square inch, then treatment must stop and immediate action must be taken.	Pressures must be monitored and recorded during treatment. If pressure changes by more than 20% or exceeds 90% of the casing yield rating, then treatment must stop and immediate action must be taken.
Monitoring after treatment	None required.	Production pressure and annular pressure must be periodically monitored for indication of well breach for the life of the well.
Prevention of "Frack Hits"	Map showing suspected faults or fractures within 0.5 miles of wellbore.	A review of all geologic features, including known faults (active or inactive), within five times the axial dimensional stimulation area.
Monitoring for seismic activity	None required.	The operator must monitor the California Integrated Seismic Network for ten days after the end of hydraulic fracturing. If there is an earthquake of magnitude 2.7 or greater in the area of treatment then treatment operations must halt while evaluation is done.
Management of recovered fluids	Recovered fluids must be stored in enclosed, above-ground tanks and cannot be stored in sumps or pits, with very limited exception.	Recovered fluids must be stored in containers[1] and cannot be stored in sumps or pits.
Public disclosure	Within 30 days after treatment, the operator must publicly disclose detailed information about the treatment, including the identity and maximum concentration of the additives and ingredients in the fluids used.	Within 60 days after treatment, the operator must publicly disclose detailed information about the treatment, including the identity and maximum concentration of the additives and ingredients in the fluids used.
Trade secret claims	Public Disclosure on FracFocus.org is required. Exemptions may be granted to protect trade secret information, but must still be provided to BLM.	Trade secret information must be publicly disclosed, with very limited exception.
Water Supply Information	Source, location, access route and transportation method for water supply must be provided to BLM.	Source and location of water supply is required as part of a water management plan and as part of post-treatment public disclosures.

1 - California's regulations do not specifically include a requirement for containers to be enclosed.

While the BLM's hydraulic fracturing rule is set aside, the following provisions of the rule will not be in effect for Federal wells in California because SB 4 does not expressly regulate the activities as stringently as would the BLM's rule:

- The requirement for all recovered fluids to be stored in enclosed, above-ground tanks.
- The requirement to map suspected faults or fractures within 0.5 miles of the wellbore. SB 4's requirement of mapping of known faults within five times the axial dimensional stimulation area (the maximum length, width, height, and azimuth of the area(s) stimulated) varies by engineering design and may not always cover the 0.5 miles mapping from the wellbore required under BLM's rule.
- The requirement of supplying BLM with information on the access route and transportation method for the water supply.

SB 4 and the hydraulic fracturing rule, while not exactly the same, have some similar requirements with respect to hydraulic fracturing. The analysis in this EIS with regard to impacts of hydraulic fracturing on geology, hazardous materials and public safety, groundwater, and surface water resources and mitigation of effects on these resources is likewise similar under both SB 4 and the BLM's hydraulic fracturing rule. See below for specific examples of impacts and mitigation under each set of regulations.

Discussion of these policies and regulations as they relate to impacts to specific resources from hydraulic fracturing can be found on the following, and other, pages in this Draft RMPA/Draft EIS as indicated in Table 2-2 below.

Table 2-2. BLM's Hydraulic Fracturing Rule and Senate Bill 4 Discussion Index (page numbers)

		Regulations	
Resource	**Impacts**	**BLM's Hydraulic Fracturing Rule**	**SB 4**
Geology	4.3-1 – 4.3-2	3.3-1 – 3.3-2	3.3-4, 4.3-2
Hazardous Materials & Public Safety	4.4-5 – 4.4-17	3.4-7, 4.4-11 – 4.4-14, 4.4-19, 4.4-20	3.4-11, 4.4-11 – 4.4-14, 4.4-19, 4.4-20
Groundwater	4.7-2 – 4.7-10	3.7-1 – 3.7-3, 4.7-2, 4.7-6 – 4.7-9	3.7-3 – 3.7-4, 3.7-9, 4.7-6 – 4.7-9
Surface Water	4.8-2 – 4.8-8	3.8-2, 4.8-2, 4.8-4 – 4.8-6, 4.8-8	3.8-4, 4.8-5 – 4.8-6, 4.8-8

The potential impacts of oil and gas development, including from hydraulic fracturing, are included in this EIS. This EIS analyzes those impacts at a programmatic scale. However, it is important to note that the effect of any particular well or field development would depend on the impact posed by site-specific engineering and operations within specific geology and upon the area's other characteristics (such as nearby wellbores). The BLM will analyze these site-specific impacts during the NEPA review for a lease or an individual well.

In summary, the requirements expressed in the policies and regulations discussed above are in several respects comparable to each other. SB 4, the BLM's hydraulic fracturing rule, and the BLM California water stipulation have been incorporated into the analysis of effects and mitigation measures in Chapter 4 of this EIS.

2.5 Overview of the Draft RMPA Alternatives

2.5.1 Allowable Uses

The five alternatives are distinguished by the type and degree of constraints described as allowable uses undertaken to achieve the desired outcomes. Allowable uses identify surface lands and Federal subsurface oil and gas mineral estate where uses are allowed. Allowable uses include any protective measures or restrictions that would be needed to meet desired outcomes, and could exclude certain land uses to protect resource values. For example, protective measures could be imposed on the location of access roads, well sites, and facility sites or on the timing of geophysical exploration, well drilling, or other operations,

consistent with the mineral rights granted by the lease. Allowable uses could result from lease stipulations (e.g., lands open to leasing with a no surface occupancy [NSO] stipulation), COAs from the surface management agency's review and environmental analysis of the proposed operations, Notices to Lessees, Onshore Orders, or regulations.

An explanation of the general types of lease stipulations is included below. The lease stipulations specific to each alternative in this RMPA/EIS are described in Sections 2.6 through 2.10 and listed in Appendix C of this RMPA/EIS. Lease stipulations apply to both Federal and split estate leases.

Lease Stipulations

Lease stipulations are necessary "if upon weighing the relative resource values, there are values, uses, and/or users identified that conflict with oil and gas operations and cannot be adequately managed and/or accommodated on other lands" (U.S. Government, 1989). BLM policy is to apply the least restrictive stipulation necessary to adequately protect the identified resource value(s). There are three general types of stipulations that may be applied to a lease (BLM, 2013; U.S. Government, 1989):

- **Controlled Surface Use (CSU):** Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operation constraints that may modify the lease rights.

  Example: No permanent facilities or structures within 2 miles of a raptor nest.

- **Timing Limitation (TL) (Seasonal Restriction):** Prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

  Example: In habitat for raptor species, no surface disturbances would be conducted during the breeding and nesting season (March 1 to August 31 for burrowing owl and March 1 to August 1 for ferruginous hawk) within spatial buffers (0.25 miles for burrowing owl and 0.5 miles for ferruginous hawk) of known nesting sites.

- **No Surface Occupancy (NSO):** Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values.

  In order for lands to be leased subject to a NSO stipulation, there must be potential for the minerals under the NSO lands to be developed from nearby lands by directionally or horizontally drilling. If the minerals under the NSO land cannot be developed from nearby lands and there is no less restrictive stipulation that would protect the resource values, then the lands should be closed to leasing.

  Example: All river corridors recommended as Wild and Scenic would be NSO for oil and gas leasing.

The circumstances for granting an exception, modification, or waiver to the specific lease stipulations included in this RMPA/EIS are documented in Appendix C. An *exception* is a one-time exemption to a lease stipulation, determined on a case-by-case basis. A *modification* is a change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A *waiver* is a permanent exemption to a lease stipulation. Exceptions, modifications, and waivers apply to all types of stipulations, including NSO stipulations, and the authorized officer may only approve an exception, modification, or waiver "if the record shows that circumstances or relative resource values have changed or that the lessee can demonstrate that operations can be conducted without causing unacceptable impacts, and that less restrictive stipulations will protect the public interest" (U.S. Government, 1989).

Lands Closed to Leasing

BLM's Land Use Planning Handbook allows for consideration of closing areas to oil and gas leasing. These are areas where it has been determined that other land uses or resource values cannot be adequately

protected with even the most restrictive lease stipulations; appropriate protection can be ensured only by closing the lands to leasing. Areas closed to leasing under each alternative are described in Sections 2.6 through 2.10 and shown on Figures 2-1 through 2-5 in Appendix A.

2.5.2 Draft RMPA Alternatives

This section summarizes the five alternatives analyzed in detail in this Draft RMPA/EIS. These alternatives present a range of reasonable management actions that were analyzed to assist decision-makers and the public in understanding the potential environmental consequences of each alternative.

The level of oil and gas development described in the RFD Scenario would apply to all five alternatives. Therefore, implementation of each alternative is assumed to result in no more than 37 exploratory and development wells (32 development wells for Alternative B) on new Federal oil and gas leases and up to 206 acres of associated disturbance from well pads, roads, and other facilities (e.g., gas plants, pipelines, and other infrastructure) during the 15- to 20-year period of analysis.

For each alternative, the BLM has identified specific lease stipulations that would protect important resource values. Additionally, the BLM could apply mitigation measures to surface use activities associated with existing land use authorizations as a COA for an APD. New lease stipulations resulting from the ROD and approved RMPA could be applied to other types of land uses and management actions (i.e., other than oil and gas leases) in order to maintain or achieve desired resource conditions.

Each alternative also considers closing different areas to oil and gas leasing. Public lands that are closed to leasing are subdivided into two groups. Tracts that have been closed by previous legislation or secretarial policy (wilderness, wilderness study areas, and Fort Ord National Monument) form one group of lands and are known as non-discretionary closures. The second group of closed lands, consisting of those proposed for closure under this plan, is called proposed discretionary closures.

Regardless of the alternative adopted in the approved ROD, existing lease stipulations attached to existing oil and gas leases, other than the 14 non-NSO leases subject to the settlement agreement, would continue to apply to those leases. New or additional lease stipulations would apply only to lands leased pursuant to the Final RMPA/EIS and ROD. Furthermore, environmental analyses would be conducted, as appropriate, for project- and site-specific actions proposed in the geographic area currently defined as the CCFO Planning Area. These site-specific evaluations would be facilitated by the planning and programmatic evaluation of impacts disclosed in the Final EIS supporting the ROD and approved RMPA. Finally, all areas currently closed to leasing under the 2007 HFO RMP would remain closed under all alternatives.

The components of each alternative are summarized in Table 2-3. Sections 2.6 through 2.10 describe each alternative, including the acreages that would be open or closed to oil and gas leasing and the stipulations applicable to management actions under that alternative. The goals, objectives, and management actions common to all alternatives are listed in Section 2.4 for energy and minerals. Figures 2-1 through 2-5 in Appendix A illustrate the major management elements of each alternative.

Leases Subject to Settlement Agreement. As described in Chapter 1, this EIS will analyze the impacts to 14 non-NSO leases that were identified in Case No. 11-06174 and Case No. 13-1749 (*Center for Biological Diversity v. Bureau of Land Management*, 2014) under each of the RMPA alternatives. While BLM will select a Preferred Alternative as part of its plan-level decision for determining which BLM-managed lands or subsurface Federal minerals are open or closed to oil and gas leasing, the determination for the 14 leases will be an implementation-level decision. For each of the 14 leases, the implementation decision will be to decide whether to issue the lease based on whether the land is available or unavailable for leasing, and if available, the BLM will determine whether the current lease stipulations are sufficient or if additional stipulations are needed. This implementation decision will be in compliance with the selected alternative of the RMPA. Table 2-4 presents a summary of the 14 non-NSO leases by alternative.

Table 2-3. Summary of Alternatives

Alternative	Areas Closed/Open to Oil & Gas Leasing	Stipulations*	Calculated GIS Acres Open with CSU	Calculated GIS Acres Closed	Calculated GIS Acres Open with NSO
A (No Action)	Areas currently open would remain open to oil and gas leasing; Areas closed under 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, Ft. Ord National Monument).	Stipulations under the 2007 HFO RMP. NSO stipulations for: ▪ ACECs; and ▪ R&PP leases. Endangered Species stipulations for all open areas.	683,800	67,500	41,700
B	Lands within oil and gas fields and 0.5-mile buffer areas currently defined by DOGGR would be open; All other areas would be closed, including those closed in the 2007 RMP (Wilderness, WSAs, Clear Creek Serpentine ACEC, Ft. Ord National Monument).	CSU stipulations on lands open to leasing.	39,000	754,000	N/A
C	High oil and gas occurrence potential areas (with the exception of core population areas of the giant kangaroo rat (*Dipodomys ingens*) in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills) or lands within oil and gas fields and 0.5-mile buffer areas would be open; Moderate, low and no oil and gas occurrence potential areas would be closed; Areas closed under 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, Ft. Ord National Monument).	CSU stipulations on lands open to leasing. NSO stipulations for: ▪ T&E critical habitat; ▪ BLM developed recreation sites and administrative sites; and ▪ Special status split estate lands (state parks, county parks, conservation easements, land trusts, scenic designations).	368,800	394,400	29,800

Table 2-3. Summary of Alternatives

Alternative	Areas Closed/Open to Oil & Gas Leasing	Stipulations*	Calculated GIS Acres Open with CSU	Calculated GIS Acres Closed	Calculated GIS Acres Open with NSO
D	Federal mineral estate underlying BLM surface estate would be open; Split estate lands would be closed; Ciervo Panoche Natural Area would be closed; Areas closed under 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, Ft. Ord National Monument).	CSU stipulations on lands open to leasing. NSO stipulations for: ▪ ACECs; and ▪ R&PP leases.	121,200	655,400	16,400
E	Federal mineral estate outside of California DWR Bulletin 118 groundwater basins & sub-basins would be open; Federal mineral estate within California DWR Bulletin 118 groundwater basins & sub-basins would be closed; Areas closed under 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, Ft. Ord National Monument).	CSU stipulations on lands open to leasing. NSO stipulations for: ▪ 12-digit Hydrologic Unit Codes intersecting EPA impaired, perennial surface waters; ▪ 12-digit Hydrologic Unit Codes intersecting non-impaired, perennial surface waters that intersect split estate; ▪ 12-digit Hydrologic Unit Codes subwatersheds with the highest aquatic intactness score ▪ 0.25 miles from non-impaired, perennial surface waters; and ▪ 0.25 miles from eligible Wild & Scenic Rivers.	487,200	99,400	206,400

* Standard lease terms apply to all areas open to leasing.
ACEC = Area of Critical Environmental Concern
NA = Not applicable
R&PP = Recreation & Public Purpose lease
T&E = Threatened & Endangered species
WSA = Wilderness Study Area

Table 2-4. Summary of Leases Subject to Settlement by Alternative

Alternative	Calculated GIS Acres Open with CSU	Calculated GIS Acres Closed	Calculated GIS Acres Open with NSO
A (No Action)	17,600	N/A	N/A
B	3,800	13,800	N/A
C	17,600	N/A	N/A
D	4,400	13,200	N/A
E	10,000	300	7,300

2.5.3 Management Actions

As discussed in Section 2.4, BLM would implement management actions established in the 2007 RMP, as well as new management actions. Table 2-5 summarizes how the 2007 RMP and new management actions would be implemented by the various Draft RMPA alternatives. The text of management actions common to all alternative is included in Section 2.4. Management actions applicable to each individual alternative are included in Sections 2.6 through 2.10.

Table 2-5. Management Actions in Draft RMPA Alternatives

Management Action and Topic	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E
Management Actions from 2007 RMP					
ENERG-COM1. Close WSAs and Wilderness Areas	x	x	x	x	x
ENERG-COM3. NSO on R&PP lease areas	x			x	
ENERG-COM4. Availability of public lands for energy and mineral development	x	x	x	x	x
ENERG-COM5. Environmental and multiple-use management constraints	x	x	x	x	x
ENERG-C1. NSO in special status species habitat in ACECs	x			x	
ENERG-C4. Stipulations and mitigation for special status species	x	x	x	x	x
New Management Actions					
ENERG-A1. Closure of Fort Ord	x	x	x	x	x
ENERG-A2. Closure of lands outside of DOGGR fields and buffer areas		x			
ENERG-A3. CSU stipulations on open lands		x	x	x	x
ENERG-A4. Closure of moderate, low, and no occurrence potential			x		
ENERG-A5. NSO to protect habitat and recreation			x		
ENERG-A6. Closure of split estate				x	

Table 2-5. Management Actions in Draft RMPA Alternatives

Management Action and Topic	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E
ENERG-A7. Closure to protect groundwater basins					x
ENERG-A8. NSO to protect surface waters					x

2.6 Alternative A (No Action Alternative)

2.6.1 Description of Alternative A

Alternative A (Figure 2-1 in Appendix A) would utilize the 2015 RFD Scenario and would continue current management under the existing 2007 HFO RMP (BLM, 2007). The updated RFD Scenario would be utilized so that this No Action alternative would remain the baseline for comparison of impacts for the four action alternatives which also use the 2015 RFD Scenario. All Federal mineral estate would be available for oil and gas leasing, except for designated wilderness, wilderness study areas (WSAs), Fort Ord National Monument, and Clear Creek Serpentine Area of Critical Environmental Concern (ACEC), which are closed under the 2007 Hollister Field Office RMP.

NSO stipulations would be applied in ACECs and Recreation and Public Purpose (R&PP) leases. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing (see Appendix D in BLM, 2007).

Under Alternative A, approximately 683,800 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing with CSU stipulation(s), 67,500 acres would be closed to leasing, and 41,700 acres would be subject to NSO lease stipulations (see Appendix D of BLM, 2007).

The No Action Alternative would continue the current management goals, objectives, and direction as specified in the 2007 Hollister Field Office RMP. In addition to the goals, objectives, and management actions common to all alternatives (see Section 2.4), BLM established the following management actions in the 2007 RMP that would apply to Alternative A:

- **ENERG-COM3.** Require No Surface Occupancy stipulations on all Recreation and Public Purposes lease areas. [*applies to Alternatives A and D only*]
- **ENERG-C1.** Oil and gas leases in ACECs would stipulate No Surface Occupancy in special status species habitat (BLM, 2007; Appendix D) [*applies to Alternatives A and D only*]

2.6.2 Leases Subject to Settlement Agreement under Alternative A – Subalternative 1

Under Alternative A, the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be open to leasing. The leases total approximately 17,600 acres. Under Subalternative 1, the implementation decision would be to issue all 14 non-NSO leases. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas of the leases.

The 14 non-NSO leases are located in San Benito and Monterey Counties. In San Benito County, eight non-NSO leases are in a mountainous area that is less than 0.5 miles north of the San Benito Mountain Research Natural Area and approximately 4 miles south of the Panoche Hills South Wilderness Study Area. These leases are within the active Vallecitos oil and gas field or within approximately 7 miles of the field boundary, as shown in Figure 2-1 (detailed view).

In Monterey County, six non-NSO leases are located across two mountainous areas with the first area approximately 4 miles west of the City of San Ardo and 4 miles north of Lake San Antonio, and the second

area approximately 9 miles south of the City of San Ardo and 1.5 miles east of Lake San Antonio. The Monterey County leases are within approximately 10 miles of the active San Ardo oil and gas field, which is generally located east of the non-NSO leases in Monterey County.

2.6.3 Leases Subject to Settlement Agreement under Alternative A – Subalternative 2

Under Subalternative 2, the management decisions for Alternative A would still apply, and the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be open to leasing. However, for analysis purposes, the implementation decision would be: (1) that the two non-NSO leases as identified in Case No. 11-06174 should not have been issued; and (2) to not issue the 12 prospective non-NSO leases as identified in Case No. 13-1749.

2.7 Alternative B

2.7.1 Description of Alternative B

Under Alternative B (Figure 2-2 in Appendix A), Federal mineral estate within the boundaries of oil and gas fields plus a 0.5-mile buffer defined by DOGGR[8] would be available for leasing. Other areas would be closed to oil and gas leasing.

Controlled Surface Use (CSU) stipulations would apply to all lands open to leasing (see Appendix C). Under Alternative B, approximately 39,000 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing with CSU stipulation(s) and 754,000 acres would be closed to leasing.

In addition to the goals, objectives, and management actions common to all alternatives (see Section 2.4), BLM established the following new management actions under Alternative B:

- **ENERG-A2.** Public lands within oil and gas fields plus a 0.5-mile buffer defined by DOGGR would be open to mineral leasing; all other public lands would be closed to mineral leasing. [*applies to Alternative B only*]
- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing. (See Appendix C.) [*applies to Alternatives B, C, D, and E only*]

2.7.2 Leases Subject to Settlement Agreement under Alternative B

Under Alternative B, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 3,800 acres would be open with CSU stipulations and 13,800 acres would be closed.

Under Alternative B, almost 80 percent of the 14 non-NSO lease acreages would be closed to leasing. Unlike Alternative A, Alternative B would change the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP.

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8 In the Environmental Impact Report prepared by DOGGR under Senate Bill 4, each oil and gas field includes a buffer area around it within which future activities may occur. Within the CCFO Planning Area, the buffer is ½ mile around existing fields. (DOC, 2015 page 5-1)

2.8 Alternative C

2.8.1 Description of Alternative C

Under Alternative C (Figure 2-3 in Appendix A), unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate would be open to leasing within high oil and gas occurrence potential areas or within the boundaries of oil and gas fields plus a 0.5-mile buffer currently identified by DOGGR, with the exception of core population areas of the giant kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills, which are closed to leasing.

CSU stipulations would apply to all lands open to leasing (see Appendix C). NSO stipulations would apply to some lands open to leasing, including: (1) threatened and endangered species critical habitat; (2) BLM developed recreation and administrative sites; and (3) special status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, and scenic designations).

Under Alternative C, approximately 368,800 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing with CSU stipulation(s), 394,400 acres would be closed to leasing, and 29,800 acres would be subject to NSO stipulations. Of the approximately 394,400 acres closed to leasing, approximately 35,400 acres are located within or in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills. The areas that are proposed for closure to leasing within Panoche, Griswold, Tumey, and Ciervo Hills areas have been selected for the protection and recovery of a core population of the federally endangered giant kangaroo rat (*Dipodomys ingens*), as well as for protection and recovery of the federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*). These areas are known to contain these listed species, and the proposed closure areas in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills are intended to maintain connectivity and movement corridors within suitable habitat for the San Joaquin kit fox. Additionally, portions of these areas are known to contain the federally endangered blunt-nosed leopard lizard (*Gambelia silus*).

While the NSO stipulation does not apply as a blanket protection for ACECs under Alternative C, protections would still be provided for the ACECs' biological resources. BLM policy is to apply the least restrictive stipulation necessary to adequately protect the identified resource value(s), thus CSU stipulations are being considered in addition to closures and NSO stipulations within the range of alternatives. Under Alternative C, approximately half of the Panoche/Coalinga ACEC, the core population areas of the giant kangaroo rat, would be closed to leasing. NSO stipulations would apply to threatened and endangered species critical habitat, and CSU stipulations would apply to the remainder of the ACEC acres left open to leasing. The CSU-Protected Species stipulation provides that presence of habitat or species may result in the proposed action being moved, modified, or delayed to mitigate project effects. This CSU stipulation also provides that offsite compensation that would satisfactorily offset the loss of habitat may be required.

In addition to the goals, objectives, and management actions common to all alternatives (see Section 2.4), BLM established the following new management actions that would apply to Alternative C:

- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing. (See Appendix C.) [*applies to Alternatives B, C, D, and E only*]
- **ENERG-A4.** Public lands within areas of high oil and gas potential or public lands within oil and gas fields plus a 0.5-mile buffer defined by DOGGR would be open to mineral leasing, with the exception of core population areas of the giant kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills, which are closed to leasing. Public lands within areas of moderate, low, and no potential would be closed to mineral leasing. [*applies to Alternative C only*]
- **ENERG-A5.** Require NSO stipulations for public lands open to leasing which include: (1) threatened and endangered species critical habitat; (2) BLM developed recreation and administrative sites; and (3) special status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, and scenic designations). [*applies to Alternative C only*]

2.8.2 Leases Subject to Settlement Agreement under Alternative C

Under Alternative C, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 17,600 acres would be open to leasing with CSU stipulations. Alternative C would not change the current management goals, objectives, and direction of the 14 leases, and no NSO stipulations would apply to the lease areas.

2.9 Alternative D

2.9.1 Description of Alternative D

Under Alternative D (Figure 2-4 in Appendix A), unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate underlying BLM surface estate would be available for leasing. All BLM split estate lands and the Ciervo Panoche Natural Area (both BLM surface and split estate lands) would be closed to leasing.

CSU stipulations would apply to all lands open to leasing (see Appendix C). NSO stipulations would be applied in ACECs and R&PP leases.

Under Alternative D, approximately 121,200 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing with CSU stipulation(s), 655,400 acres would be closed to leasing, and 16,400 acres would be subject to NSO stipulations.

In addition to the goals, objectives, and management actions common to all alternatives (see Section 2.4), BLM established the following management actions in the 2007 RMP that would apply to Alternative D:

- **ENERG-COM3.** Require No Surface Occupancy stipulations on all Recreation and Public Purposes lease areas. [*applies to Alternatives A and D only*]
- **ENERG-C1.** Oil and gas leases in ACECs would stipulate No Surface Occupancy in special status species habitat (BLM, 2007; Appendix D) [*applies to Alternatives A and D only*]

The following new management actions would also be established in addition to those established in the 2007 RMP for Alternative D:

- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing. (See Appendix C.) [*applies to Alternatives B, C, D, and E only*]
- **ENERG-A6.** Federal mineral estate underlying BLM surface estate would be open to mineral leasing. Split estate public lands would be closed to mineral leasing. [*applies to Alternative D only*]

2.9.2 Leases Subject to Settlement Agreement under Alternative D

Under Alternative D, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 13,200 acres would be closed and 4,400 acres would be open with CSU stipulations.

Under Alternative D, approximately 75 percent of the 14 non-NSO lease acreages would be closed to leasing. Unlike Alternative A, Alternative D would change the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP.

2.10 Alternative E

2.10.1 Description of Alternative E

Under Alternative E (Figure 2-5 in Appendix A), unless currently closed under the 2007 Hollister Field Office RMP, Federal mineral estate outside of a California Department of Water Resources (DWR) Bulletin 118, Groundwater Basin or Sub-basin, would be available for leasing.

CSU stipulations would apply to all lands open to leasing (see Appendix C). NSO stipulations would apply to some lands open to leasing, including: (1) 12-digit Hydrologic Unit Codes (HUCs) intersecting EPA impaired, perennial surface waters (BLM surface and split estate); (2) 12-digit HUCs intersecting non-impaired, perennial surface waters that intersect split estate; (3) 12-digit HUC subwatersheds with the highest aquatic intactness score; (4) 0.25 miles from non-impaired, perennial surface waters; and (5) 0.25 miles from eligible Wild and Scenic Rivers.

Under Alternative E, approximately 487,200 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing with CSU stipulation(s), 99,400 acres would be closed to leasing, and 206,400 acres would be subject to NSO stipulations.

In addition to the goals, objectives, and management actions common to all alternatives (see Section 2.4), BLM established the following new management actions that would apply to Alternative E:

- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing. (See Appendix C.) [*applies to Alternatives B, C, D, and E only*]
- **ENERG-A7.** Public lands outside of California DWR Bulletin 118 groundwater basins and sub-basins would be open to mineral leasing. Public lands within California DWR Bulletin 118 groundwater basins and sub-basins would be closed to mineral leasing. [*applies to Alternative E only*]
- **ENERG-A8.** Require NSO stipulations for public lands open to leasing which include: (1) 12-digit Hydrologic Unit Codes (HUCs) intersecting EPA impaired, perennial surface waters (BLM surface and split estate); (2) 12-digit HUCs intersecting non-impaired, perennial surface waters that intersect split estate; (3) 0.25 miles from non-impaired, perennial surface waters; and (4) 0.25 miles from eligible Wild and Scenic Rivers; and (5) 12-digit HUC subwatersheds with the highest aquatic intactness score. [*applies to Alternative E only*]

2.10.2 Leases Subject to Settlement Agreement under Alternative E

Under Alternative E, of the BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, approximately 10,000 acres would be open with CSU stipulations, 7,300 acres would be open with NSO, and 300 acres would be closed. Under Alternative E, approximately 57 percent of the 14 non-NSO lease acreages would be open to leasing with CSU stipulations, 41 percent would be open in areas subject to NSO stipulations, and 2 percent would be closed to leasing. Unlike Alternative A, Alternative E would incorporate new restrictions in the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP.

2.11 Comparison of Alternatives

A detailed comparison of alternatives is presented in Table 2-6. It should be noted that not all resources or resource uses presented in Chapter 3 (Affected Environment) or Chapter 4 (Environmental Consequences) of this Draft RMPA/EIS are included in Table 2-6. This is because revision of some decisions and management actions included in the 2007 Southern Diablo Mountain Range and Central Coast of California RMP do not relate to an increase in oil and gas exploration, development, and production, or the potential effects of that increase on other resources or resource uses, and, thus, are beyond the scope of this Draft RMPA/EIS. Additionally, because of the distribution of some resources, the effects of the decisions and management actions relating to oil and gas would be the same or similar under all alternatives. These resources are not included in Table 2-6.

Table 2-3 in Section 2.5.2 provides a comparison of acreages affected by allowable uses and management actions for each alternative. The environmental consequences of allowable uses and management actions proposed under each alternative are analyzed in Chapter 4.

2.12 Alternatives Considered but Not Analyzed in Detail

The following alternatives were considered as possible management approaches but were eliminated from detailed analysis because the BLM determined that they either did not meet the purpose and need for the RMPA/EIS (see Section 1.1), were covered under alternatives analyzed in the RMPA/EIS, or were not practical or feasible alternatives due to technical, economic, and legal and policy considerations. These alternatives include:

- Close Special Surface Status Split Estate Lands
- No Action Alternative without NSO Stipulations
- Ban Well Stimulation Technologies
- Close All Lands Except Existing Leases
- Close All Lands to Oil and Gas Leasing

The specific rationale for dismissing each alternative from further consideration is described below.

Table 2-6. Comparison of Alternatives

Resource	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Energy and Minerals	Provides most flexibility for oil and gas drilling	Provides least flexibility for oil and gas drilling	Provides more flexibility for oil and gas drilling than Alternatives B and D	Provides more flexibility for oil and gas drilling than Alternative B	Provides more flexibility for oil and gas drilling than Alternatives B, C, and D
Hazardous Materials and Public Safety	Does not confine impacts to the public due to upset conditions Emergency response times could be longest	Confines impacts to the public due to upset conditions to areas of existing oil and gas production and active fields Emergency response times would likely be shortest	Does not confine impacts to the public due to upset conditions Emergency response times could be third longest	Confines impacts to the public due to upset conditions to BLM surface estate Emergency response times could be second shortest	Confines impacts to the public due to upset conditions to outside groundwater basins Emergency response times could be second longest
Air Quality and Atmospheric Conditions	Greatest potential for causing localized air quality impacts to sensitive receptors	Limited potential for causing localized air quality impacts to sensitive receptors	Potential for causing localized air quality impacts to sensitive receptors but minimized with CSU/Management stipulations	Limited potential for causing localized air quality impacts to sensitive receptors but minimized with CSU/Management stipulations	Potential for causing localized air quality impacts to sensitive receptors but minimized with CSU/Management stipulations
Groundwater Resources	Could impact 4 groundwater basins assigned a high priority ranking	Could impact 1 groundwater basin assigned a high priority ranking	Could impact 3 groundwater basins assigned a high priority ranking	Could impact 3 groundwater basins assigned a high priority ranking	Would not impact groundwater basins assigned a high priority ranking Most protective for groundwater resources
Surface Water Resources	Could impact largest number of watersheds	With Alternative E, would impact fewest number of watersheds	With Alternative D, Alternative C would impact fewer watersheds than Alternative A but more than Alternative B and E	With Alternative C, Alternative D would impact fewer watersheds than Alternative A but more than Alternative B and E	With Alternative B, would impact fewest number of watersheds

Table 2-6. Comparison of Alternatives

Resource	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Biological Resources	Least protective of biological resources	With Alternative E, more protective of biological resources than Alternative A but less protective than Alternatives C and D	Most protective of T&E species habitat	Most protective of the Ciervo Panoche Natural Area and the special status species found in that area	With Alternative B, more protective of biological resources than Alternative A but less protective than Alternatives C and D
Visual Resources	Potential to be inconsistent with VRM Class II and Class III objectives	Potential to be inconsistent with VRM Class III objectives	Potential to be inconsistent with VRM Class II and Class III objectives	Potential to be inconsistent with VRM Class II and Class III objectives	Potential to be inconsistent with VRM Class I, Class II, and Class III objectives
Special Management Areas	Less adverse effects than Alternatives C and E, more adverse effects than B and D	Least adverse effects	Greatest adverse effects	Less adverse effects than Alternatives A, C, and E, more adverse effects than Alternative B	Less adverse effects than Alternative C, more adverse effects than Alternatives A, B, and D
Social and Economic Conditions	Adverse effects from split estate would be similar to Alternatives C and E	Less adverse effects from split estate lands than Alternatives A, C, and E	Adverse effects from split estate would be similar to Alternatives A and E	No potential adverse effects from split estate lands	Adverse effects from split estate would be similar to Alternatives A and C
Lands and Realty	Greatest flexibility for BLM's options for locating ground disturbing activities	Most restrictive of BLM's options for locating ground disturbing activities	Greater flexibility for BLM's options for locating ground disturbing activities than Alternatives B and D	Greater flexibility for BLM's options for locating ground disturbing activities than Alternative B	Greater flexibility for BLM's options for locating ground disturbing activities than Alternatives B, C and D
Wild and Scenic Rivers	Greatest potential for impacts to National Wild and Scenic Rivers	Negligible impact to National Wild and Scenic Rivers	Greater potential for impacts to National Wild and Scenic Rivers than Alternative B, similar potential as Alternative E and less than potential than A and D	Greater potential for impacts to National Wild and Scenic Rivers than Alternative B, C, and E, similar potential as Alternative A	Greater potential for impacts to National Wild and Scenic Rivers than Alternative B, similar potential as Alternative C and less than potential than A and D

2.12.1 Close Special Surface Status Split Estate Lands

The BLM considered an alternative that would close special surface status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, scenic designations) to oil and gas leasing and development. Other split estate lands would be open to oil and gas leasing and development. BLM eliminated this alternative from further consideration, because closure of all split estate lands under Alternative D would include closure of special surface status split estate lands. Therefore, closure of lands under this alternative is already addressed in this RMPA/EIS under Alternative D and no separate analysis is necessary.

2.12.2 No Action Alternative without NSO Stipulations

The BLM considered an alternative that would close the same lands as would be closed under the No Action Alternative (Alternative A). However, NSO stipulations for ACECs and R&PP leases would be removed. BLM eliminated this alternative from further consideration because such an alternative would be too similar to the No Action Alternative and thus has already been covered in the range of alternatives evaluated in this RMPA/EIS.

2.12.3 Ban Well Stimulation Technologies

BLM has statutory authority for regulation of all oil and gas field operations on Federal mineral estate under the Mineral Leasing Act of 1920, the Federal Land Policy and Management Act (FLPMA) of 1976, and the Federal Oil and Gas Royalty Management Act of 1982, among others. Regulatory authority to implement these statutes is codified in Titles 43 and 40 of the Code of Federal Regulations. Under Federal regulations the BLM, as the Federal minerals and/or surface owner, is responsible for regulating oilfield operations (well and surface resources) on all Federal mineral estate.

The BLM considered an alternative that would ban the use of well stimulation technologies on Federal mineral estate. This alternative was eliminated from further consideration because while BLM has the authority to deny individual permits, it does not have authority to deny all future well stimulation technologies. Rather BLM has a responsibility under the FLPMA to act as a steward for the development, conservation, and protection of Federal lands, by implementing multiple use principles and recognizing, among other values, the Nation's need for domestic sources of minerals from the public lands. A ban or moratorium would not satisfy the BLM's multiple-use responsibilities under the FLPMA.

Additionally, the BLM Land Use Planning Handbook H-1601-1 states that, for oil and gas decisions, "[w]hen applying leasing restrictions, the least restrictive constraint to meet the resource protection objective should be used" (BLM, 2005, Appendix C, pg. 24). An alternative banning well stimulation technologies in the Plan Area would be inconsistent with the basic policy objectives for management of oil and gas resources in BLM.

2.12.4 Close All Lands Except Existing Leases

The BLM considered an alternative where all lands would be closed to oil and gas leasing and development except for existing leases. As discussed in Section 2.12.3, the FLPMA of 1976 establishes the authority and provides guidance for how public lands are to be managed by the BLM. Furthermore, it defines BLM's mission to manage public lands on the basis of multiple use and sustained yield. Energy development is one of those uses.

Likewise, the Mining and Minerals Policy Act of 1970 declares that "it is the continuing policy of the Federal Government in the national interest to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining [and] minerals... (2) the orderly and economic development of domestic mineral resources [and] reserves.... For the purposes of this section 'minerals' shall include all minerals and minerals fuels including oil [and] gas."

In addition, BLM's Land Use Planning Handbook 1601-1 indicates that lands should not be closed to leasing unless it is determined that other land uses or resources cannot be adequately protected with even the most restrictive lease stipulations. Finally, BLM Manual 3120 states "It is the Bureau of Land Management's (BLM) policy to encourage the orderly development of Federal onshore oil and gas resources by offering lands for oil and gas leasing by competitive oral bidding when eligible lands are available."

The alternatives brought forward in this RMPA/EIS represent the areas within the CCFO Planning Area that the BLM needs to consider closing to protect sensitive resources, but it is not necessary to close all lands to leasing except existing leases. Furthermore, this alternative would be contrary to BLM's mission and policies, which dictate management of public lands for multiple-uses and encourage energy development. Therefore, an alternative that would close all lands to oil and gas leasing except existing leases has been eliminated from further consideration in this RMPA/EIS.

2.12.5 Close All Lands to Oil and Gas Leasing

The BLM considered an alternative that would close all Federal mineral estate to oil and gas leasing and development. For the same reasons discussed in Section 2.12.4, this alternative would be contrary to BLM's mission and policies, which dictate management of public lands for multiple-uses and encourage energy development. Therefore, an alternative that would close all lands to oil and gas leasing has been eliminated from further consideration in this RMPA/EIS.

Chapter 3

Affected Environment

3. Affected Environment

3.1 Introduction

This chapter describes existing conditions for Bureau of Land Management (BLM) resource programs, resource uses, special designations, and the social and economic environment in the Central Coast Field Office (CCFO) Planning Area. The description of the affected environment uses the best and most recent data available.

In addition to describing existing conditions, where appropriate, this chapter identifies management challenges for oil and gas development within the Planning Area. The BLM reviewed current management and reviewed the scoping comments to revise the 2007 Hollister Field Office Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California. By describing existing conditions for resource programs in the Planning Area, this chapter serves as the baseline against which Chapter 4 analyzes potential impacts of the alternatives.

The CCFO Planning Area encompasses about 6.8 million acres of land throughout San Francisco, Contra Costa, San Mateo, Alameda, San Joaquin, Santa Cruz, Santa Clara, Stanislaus, Monterey, San Benito, Merced, and Fresno Counties. Most of the acres are in private, State, or local ownership. Bounded by the Pacific Ocean to the west and the San Joaquin Valley to the east, elevations range from sea level to over 5,000 feet. This is a region of diverse topography and landscapes and extraordinary biodiversity. Major landforms include the Diablo Mountain Range, Salinas Valley, and San Joaquin Valley. Public lands are distributed across the Planning Area in numerous small parcels. The BLM CCFO is directly responsible for the management of approximately 284,000 acres of public land (less than 1% of the total) and 793,000 acres of Federal mineral estate (approximately 1.2% of the total).

3.1.1 Resources Not Considered

This chapter does not provide detail about environmental components that would not be affected or that are not essential to understanding or resolving planning issues. These include the following resources:

Back County Byways. There are no designated Back County Byways in the Planning Area.

Cave and Karst Resources. No areas of karst formation or caves are known to occur within the Planning Area.

Fire Management. No additional effects to Fire Management would result from the Oil and Gas Management not already addressed in the 2007 HFO RMP[1] (BLM, 2006). The risk of fire is addressed in Hazardous Materials and Public Safety.

Forest and Woodland Products. Forest and woodland management produces traditional market products such as lumber, plywood, and paper as well as other uses such as poles, greenery, biomass for energy production, and fuelwood for personal use while concurrently maintaining high-quality wildlife habitat. There are no forests managed for forest products on BLM lands in the Planning Area.

Livestock Grazing. The BLM CCFO administers 71 active commercial grazing leases for both sheep and cattle. Forage generally consists of annual grasses and forbs which grow during these wetter months. Rangelands are managed to ensure that enough residual mulch remains after each grazing season. No addi-

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[1] See Proposed RMP/Final EIS for the Southern Diablo Mountain Range and Central Coast of California Section 3.7 (Fire Management) for the affected environment and 4.7 (Fire Management) for the effects analysis. See Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California Record of Decision Section 3.7 (Fire Management) for the Resource Management Plan.

tional effects to Livestock Grazing would result of the Oil and Gas Management not already addressed in the 2007 HFO RMP,[2] the management of livestock would remain the same.

Recreation. The diverse landscapes of the CCFO Planning Area provide for a variety of recreational opportunities, including: hiking, mountain biking, and equestrian trails, hunting, and camping. There would be no additional effects to Recreation as a result of the Oil and Gas Management not already addressed in the 2007 HFO RMP.[3]

Wild Horses and Burros. There are no Wild Horses and Burros Management Areas in the CCFO Planning Area.

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[2] See Proposed RMP/Final EIS for the Southern Diablo Mountain Range and Central Coast of California Section 3.11 (Livestock Grazing) for the affected environment and 4.11 (Livestock Grazing) for the effects analysis. See Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California Record of Decision Section 3.11 (Livestock Grazing) for the Resource Management Plan.

[3] See Proposed RMP/Final EIS for the Southern Diablo Mountain Range and Central Coast of California Section 3.8 (Recreation) for the affected environment and 4.8 (Recreation) for the effects analysis. See Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California Record of Decision Section 3.8 (Recreation) for the Resource Management Plan.

3.2 Energy and Minerals

This section addresses exploration, development, and production for energy and mineral resources. Considering that the RFD Scenario addresses the possibility of drilling up to 37 new exploration and development oil and gas wells, the principal issue in this section is the potential interference of those operations with new or expanded mineral development. Historically, both oil and gas and mineral development have been low on public lands managed in the CCFO Planning Area (BLM, 2006). More recently, renewable energy has gained interest nationally, and the CCFO Planning Area has the potential to expand existing and new wind and solar energy production capacity on public lands.

There is little active mining on or immediately adjacent to BLM-administered land in the CCFO Planning Area. Some mining for building stone, sand and gravel, shale, and limestone has occurred in the past at the Coast Dairies, Fort Ord, and near the Griswold Hills in the Vallecitos Valley. The BLM oversees 793,000 acres of Federal mineral estate.

3.2.1 Introduction

Interference between oil well drilling and existing or future mining activities would occur if oil drilling pads, access roads, or oil field facilities overlay the minerals to be developed and thus restricted mining access. Mines and renewable energy projects operate with distinct boundaries, so-called "footprints." New well sites could be accessed via existing roads with permission to cross granted by the mine or energy operator. If new oil wells must target subsurface petroleum beneath surface mines or renewable energy projects, directional drilling will be required. Conversely, new or future oil well sites could restrict access to underlying mineral deposits. However, in general, a relatively small oil well pad and access road would not completely restrict access to potential surface deposits of sand and gravel, building stone, shale and limestone. Similarly, oil and gas could be compatible with some types of renewable energy.

3.2.2 Regulatory Framework

Federal Regulations

The BLM manages oil and gas leases under Title 43 CFR, Part 3100, and geophysical exploration is covered under Part 3150. Geothermal leasing is managed under Part 3200, mineral materials under Part 3600, mining claims and related surface disturbance for locatable minerals under Part 3800, and solid leasable minerals, other than coal or oil shale, under Part 3500.

The BLM administers three different programs (Mining Law, Mineral Leasing–Solid and Fluid Minerals, and Mineral Materials) in California that allow companies to produce solid minerals from the public land. The programs are based on laws that address how certain types of minerals can be developed. The most significant laws for mineral disposal are:

- The General Mining Law of 1872, as amended covering all minerals not specifically addressed under the Mineral Leasing Act of 1920, as amended; the Materials Act of 1947, as amended, and the Mineral Leasing Act for Acquired Lands of 1947, as amended;
- The Mineral Leasing Act of 1920, as amended covering coal, phosphate, oil, oil shale or gas, and sodium – on public land;
- The Materials Act of 1947, as amended covering sand, gravel, and other common materials; and
- The Mineral Leasing Act for Acquired Lands of 1947, as amended covering soda ash, potash, sodium sulfate, and salt, on public land.

Many significant laws important to solid mineral development have amended the key mineral disposal statutes listed above. Other laws governing the management of the public land and the protection of the environment include:

- The Federal Land Policy and Management Act of 1976,
- The National Environmental Policy Act of 1969,
- The Endangered Species Act of 1973, and
- The Clean Water Act.

The 1920 Mineral Leasing Act governs the leasing of oil and gas lands and applies to all federally owned minerals. The Mineral Leasing Act provides that all of these lands are open to oil and gas leasing unless a specific order has been issued to close the area to leasing.

BLM holds lease sales of the oil and gas resources in accordance with the Federal Onshore Oil and Gas Leasing Reform Act. Subject to the stipulations outlined in this Plan Amendment, BMPs, standard terms and conditions of the lease, an oil and gas lease gives the lessee the exclusive right to extract the resource and to occupy the appropriate size area necessary for extraction. The lessee may conduct activities necessary to develop and produce oil and gas from the lease area, including drilling wells, building roads, and constructing pipelines and related facilities. Although the initial lease term is 10 years, the lease may be extended indefinitely as long as the lessee demonstrates that the lease is capable of producing oil or gas in paying quantities. Extended leases are considered "held by production." Unleased parcels, or parcels for which the term has expired without development, may be requested by the oil and gas industry for inclusion in a new lease sale or required to undergo site restoration.

BLM jointly, with the California Division of Oil, Gas and Geothermal Resources (DOGGR), oversees the drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells. Applicable Federal regulations include 43 CFR 3160, Onshore Oil and Gas Operations, which are administered by the BLM and govern operations associated with the exploration, development and production of oil and gas deposits from leases issued or approved by the U.S., restricted Indian land leases and those under the jurisdiction of the Secretary of the Interior by law or administrative arrangement. The BLM Onshore Oil and Gas Orders implement and supplement the oil and gas regulations in 43 CFR 3160 for conducting oil and gas operations on Federal and Indian lands. They include the following:

- Order No. 1 – Approval of Operations provides procedures for submitting an Application for Permit to Drill and all required approvals of subsequent well operations and other lease operations.
- Order No. 2 – Drilling provides requirements and standards for drilling and abandonment.
- Order No. 3 – Site Security provides requirements and standards for site security.
- Order No. 4 – Measurement of Oil provides requirements and standards for measurement of oil.
- Order No. 5 – Measures of Gas provides requirements and standards for measurement of gas.
- Order No. 6 – Hydrogen Sulfide Operations provides the requirements and standards for conducting oil and gas operations in an environment known to or expected to contain hydrogen sulfide gas.
- Order No. 7 – Disposal of Produced Waters provides the methods and approvals necessary to dispose of produced water associated with oil and gas operations.

Approval for the technical and downhole work is done for most activities by the BLM Bakersfield Field Office, while review and approval of the surface use is conducted by the multi-resources staff located in the BLM Central Coast Field Office. Approval for downhole Underground Injection Control (UIC) activities, including all injection well activities, is performed by DOGGR under primacy that was granted by the Federal government in 1982. Applicable regulations include California Public Resources Code,

Division 3, which governs the regulation of oil and gas operations; and California Code of Regulations Title 14, Division 2, Chapter 4: Development, Regulation, and Conservation of Oil and Gas Resources.

State Regulations

California's State and Surface Mining and Reclamation Act (SMARA) of 1975 was enacted in response to land use conflicts between essential mineral production and land development for other purposes. The stated purpose of SMARA is to provide a comprehensive surface mining and reclamation policy that will encourage the production and conservation of mineral resources while ensuring that adverse environmental effects of mining are prevented or minimized; that mined lands are reclaimed to a usable condition; and residual hazards to public health and safety are eliminated; and consideration is given to recreation, watershed, wildlife, aesthetic, and other related values.

The California Division of Oil, Gas, and Geothermal Resources (DOGGR) regulates production of oil and gas, as well as geothermal resources, within the State of California on private lands. DOGGR requirements in preparation of environmental documents under the California Environmental Quality Act are defined in CCR, Title 14, Division 2, Chapter 2. DOGGR regulations, which are defined in CCR, Title 14, Division 2, Chapter 4, include well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines. DOGGR regulates well abandonment procedures to ensure effectiveness in preventing migration of oil and gas from a producing zone to shallower zones, including potable groundwater zones. DOGGR oversees well operations. DOGGR also has regulatory authority over Class II injection wells for enhanced recovery and disposal. In California, the operation of all Class II injection wells are regulated by DOGGR, under provisions of CCR Sections 1724.6, 1724.7, 1724.9 and 1724.10, and the Federal Safe Drinking Water Act. When an operator ceases well operation or production, State law requires the well is abandoned within a reasonable time period.

3.2.3 Regional Setting

Oil and Gas

The history of activity for oil and gas exploration and development on Federal mineral estate within the planning area is extremely low compared to private lands. The Reasonable Foreseeable Development Scenario (Appendix B) provides a detailed discussion of the regional setting for oil and gas in the CCFO Planning Area on Federal and private lands.

There are 35 active oil fields and gas fields within the Planning Area. Within those administrative areas, the actual productive areas total about 195,300 acres. Twelve of the 35 active fields intersect Federal mineral estate. Since 1994, more than 1,000 wells have been drilled within the CCFO Planning Area; however, not a single well was drilled on the Federal mineral estate, and none of the wells resulted in a new field discovery. In fact, during the past 30 years, only one new field was discovered within the CCFO Planning Area (the Bixler gas field, a very small 4-well, 1.5-square-mile gas field discovered in Contra Costa County in 1993). That field was abandoned in 2002.

The most productive oil and gas fields within the CCFO Planning Area are Coalinga oil and gas field with Coalinga East Extension oil and gas field, San Ardo oil and gas field, Lynch Canyon oil and gas field, Jacalitos oil and gas field, Kettleman North Dome oil and gas field, and Sargent-Hollister oil and gas field (see Section 1; DOGGR, 2010). Of the total producing wells within the CCFO Planning Area, approximately 3 percent occur on Federal authorized leases, see Appendix B for additional details.

Minerals

Locatable minerals are those for which the right to explore, develop, and extract mineral resources on Federal lands open to mineral entry is established by the location (or staking) of lode or placer mining

claims. In general, metallic minerals are locatable; however, some nonmetallic minerals are also considered locatable. Generally, locatable minerals such as gold, silver, copper, lead, zinc, tungsten, mercury, chromium, manganese, antimony, uranium occur where a thermal heat source and mineral-bearing fluids (hydrothermal) forms a lode deposit. Typically these hydrothermal deposits do not occur directly adjacent (laterally or vertically) to petroleum resource areas. Non-metallic deposits such as diatomaceous shale, diatomite, limestone, Fuller's earth, or dimensional stone may occur near petroleum reservoirs. Potential for locatable minerals exists throughout the mountainous and coastal regions, although only limited active mining occurs on or immediately adjacent to BLM-administered land.

Renewable Energy

Solar and wind energy development has increased in the last decade throughout California. Within the CCFO Planning Area, large solar development is planned for Panoche Valley in San Benito County, California Flats near the borders of Monterey, San Luis Obispo, Kings and Fresno Counties, Tranquility, Fresno County, and southwestern Merced County. Smaller projects, typically less than 20 MW and 200 acres in size, may occur elsewhere in the CCFO Planning Area; however, much of the CCFO Planning Area is characterized by rolling hills making it less appropriate for larger solar energy projects.

Wind energy potential is low in much of the CCFO Planning Area except in the Altamont Pass which is characterized by numerous wind farms, many of which are from the 1970s and are in the process of being upgraded. None of the CCFO Decision Area mineral estate lands are mapped as having good wind resource potential (NREL, 2012).

3.2.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Historic and recent oil and gas exploration and development on BLM-administered land in the CCFO Planning Area have been low. The RFD Scenario outlines estimates for up to 37 new wells to be drilled primarily within high- to moderate-potential petroleum resource areas in the next 15 years.

There are various small abandoned mines and prospects, mainly for mercury, in the San Joaquin Management Area. These mines include the Red Hill/Western Mines and Gallo mercury mines in Stanislaus County. Mining of sand and gravel occurs on private lands adjacent to Fort Ord public lands. The presidential proclamation establishing the Fort Ord National Monument declared the former Fort Ord military base closed to mineral location and leasing.

RMC Pacific Materials conducted mining operations in a shale quarry and limestone quarry for cement on lands surrounded by the Coast Dairies property for the Cemex Davenport Plant. This plant was closed in 2010 (Alexander, 2010). Building stone mineral production occurs in the Williams Hill area in the Salinas Management Area.

Leases Subject to Settlement Agreement

The 14 non–no surface occupancy (NSO) leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in a historically nonproductive wildcat area west of San Ardo Field (DOGGR, 2007), and in the Vallecitos oil field. Well drilling, possibly well stimulation, and possibly field development in the Vallecitos Field may occur on these leases. Although these leases either have not been issued or have been suspended, it is possible that some or all of the 37 exploratory or development wells could be drilled on these leases in the future.

3.3 Geology

This section describes the geology, faults and slopes in the CCFO Planning Area. The analysis addresses the existing geologic and seismic hazards that may potentially impact the project, in particular slope stability in work areas defined by new access roads and new well drilling pads. Earthquakes or seismic hazards related to strong shaking should be considered for the more permanent facilities in developed oil fields such as gathering lines, staging areas with chemical storage, and tank batteries.

3.3.1 Introduction

Soil erosion and slope stability, including landslides, are the principal geologic hazards related to new oil and gas facilities in the CCFO Planning Area. Erodible soils are common to the Planning Area as are geologic units prone to landslides or slope instability where disturbed by grading. Strong to very strong ground shaking due to earthquakes along major faults in the Planning Area should be anticipated. Fault rupture of the ground surface would impact project sites where access roads and pipelines cross active faults.

In some cases, compliance with existing laws and regulations would serve to reduce or avoid certain impacts that might otherwise occur with the implementation of the project. In other cases, existing laws and regulations do not address a potential concern or practice, such as injection of various waste and material streams via Class II injection wells within active fault or seismic zones. Therefore, existing laws and regulations would not serve to reduce or avoid impacts from such practices during implementation of the project. In addition to Federal regulations that require operators to submit a permit application to BLM for new wells, California regulations also require operators to prepare and submit a permit application for new wells to DOGGR for review and approval, including any type of injection or well stimulation. DOGGR considers existing fault data in evaluating the permit and its decision to either approve or deny the permit. In addition, BLM's hydraulic fracturing rule also requires the operator to disclose any faults that may be affected by well stimulation, and requires an analysis of the potential for any seismic impacts. These processes serve to reduce the potential seismic hazard impacts of well stimulation activities or fluid disposal in injection wells.

There has been public concern regarding induced seismicity from well stimulation treatments and concern that it appears to be related to injection and not the fracturing of formations. However, researched literature indicates the potential for induced seismicity from currently practiced well stimulation treatments and wastewater injection in California is low (DOC, 2015).

In California and the CCFO Planning Area, the injection/disposal of wastewater, flowback of stimulation fluids, produced water, and other oilfield process waters (collectively referred to as injected fluids) is considered Class II injection, and is regulated by DOGGR under its Underground Injection Program (URIC), which is monitored and audited by the EPA under the Federal Safe Drinking Water Act (SDWA). In California, the volume of flowback water from well stimulation is a very small percentage of total fluid produced from a field, so the impacts from the disposal of flowback fluids are anticipated to be negligible (CCST, 2014). Also, the volume of material injected for well stimulation represents a small fraction of the total injected fluids in any given petroleum field in California (DOC, 2015), so the additional impact from injecting the small volume of stimulation material is anticipated to be negligible. There has been no direct link of induced seismicity caused by oil and gas operations wastewater disposal in California and the overall seismic hazard is low (CCST, 2014).

3.3.2 Regulatory Framework

Federal

Mineral Leasing Act. The Mineral Leasing Act of 1920, as amended, gives the BLM the responsibility for oil and gas leasing on about 564 million acres of BLM, national forest, and other Federal lands, as

well as State and private surface lands where mineral rights have been retained by the Federal government, for a total of 700 million acres of mineral estate. As such, the BLM reviews and approves permits and licenses from companies to explore, develop, and produce oil and gas resources on both Federal and Native American lands. The BLM is responsible for inspection and enforcement of oil, gas, and other development operations to ensure that lessees and operators comply with the lease requirements and BLM's regulations.

Bureau of Land Management: Onshore Oil and Gas Operations (43 CFR Part 3160 et seq.). Regulations administered by the BLM to govern oil and gas operations require that operators conduct operations in a manner which protects the mineral resources, other natural resources, and environmental quality. Before approving any application for permit to drill, the BLM evaluates and considers environmental impacts. BLM has strict standards for well construction and design, well abandonment operations, and safety requirements. As part of BLM's oversight responsibilities, operators are required to exercise care and diligence to assure that leasehold operations would not result in undue damage to surface or subsurface resources or surface improvements. All produced water must be disposed of by injection into the subsurface, by approved pits, or by other methods which have been approved by the authorized officer. Upon the conclusion of operations, the operator must reclaim the disturbed surface in a manner approved or reasonably prescribed by the BLM. Spills or leakages of oil, gas, produced water, toxic liquids, or waste materials, and blowouts are reported to the BLM. Operators are required to control and remove pollutants that could affect surface waters. Federal regulations require operators to maintain and provide detailed copies of all drilling, production, and abandonment activities conducted on Federal mineral estate, and for California those operational records are maintained in the BLM Bakersfield Field Office.

The BLM rule on hydraulic fracturing complements existing regulations (set out at 43 CFR 3162.3–1 and Onshore Oil and Gas Orders 1, 2 and 7) designed to ensure the environmentally responsible development of oil and gas resources on Federal and Indian lands. Existing regulations establish that the BLM has authority to regulate oil and gas operations within its administrative areas and set forth rules for the approval and conduct of these operations. The rule requires a map showing suspected faults or fractures within 0.5 miles of a wellbore.

Earthquake Hazards Reduction Act. The Earthquake Hazards Reduction Act (EHRA) of 1977 established the National Earthquake Hazards Reduction Program (NEHRP) as a long-term earthquake risk reduction program for the United States. The four basic NEHRP goals are: develop effective practices and policies for earthquake loss reduction and accelerate their implementation; improve techniques for reducing earthquake vulnerabilities of facilities and systems; improve earthquake hazards identification and risk assessment methods, and their use; and improve the understanding of earthquakes and their effects. There are four Federal agencies participating in NEHRP: the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NITS), the National Science Foundation (NSF), and the U.S. Geological Survey (USGS) (NEHRP, 2015).

Clean Water Act/National Pollutant Discharge Elimination System. Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it picks up pollutants like sediment, debris, and chemicals. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat and high volumes of runoff can cause stream bank erosion. Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Stormwater program requires operators of construction sites 1 acre or larger (including smaller sites that are part of a larger common plan of development) to obtain authorization to discharge stormwater under a NPDES construction stormwater permit and the development. Implementation of stormwater pollution prevention plans (SWPPPs) is the focus of NPDES stormwater permits for regulated construction activities.

Most states are authorized by the United States Environmental Protection Agency (EPA) to implement the Stormwater NPDES permitting program. Project operators must meet the requirements of the EPA Con-

struction General Permit (CGP). In California, Stormwater NPDES permits on non-tribal and non-Federal land are overseen by the State of California EPA (CalEPA). As stated by the California State Water Resource Control Board (SWRCB), a SWPPP should be prepared for each project involving more than 1 acre of ground disturbance. The SWPPP must list Best Management Practices (BMPs) the discharger will use to protect stormwater runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for non-visible pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body.

Federal Safe Drinking Water Act. According to U.S. Environmental Protection Agency (EPA) regulations, produced water injection wells are classified as Class II wells, and subdivided into II-R wells for enhanced recovery and II-D wells for disposal. In California, the operation of all Class II injection wells are regulated by DOGGR, under provisions of CCR Sections 1724.6, 1724.7, 1724.9 and 1724.10, and the Federal Safe Drinking Water Act. Under a Primacy Agreement with the EPA, DOGGR has oversight over Class II underground injection in California.

State

Alquist-Priolo Earthquake Fault Zoning Act, PRC, Section 2621–2630. The Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) of 1972 (formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. While this Act does not specifically regulate development of facilities such as oil fields and pipelines, it does help define areas where fault rupture is most likely to occur. Faults that display evidence of rupture within Holocene time are considered "active." A fault must be shown to be "sufficiently active" and "well defined" by detailed site-specific geologic explorations in order to determine whether building setbacks or other mitigation measures should be established.

Seismic Hazards Mapping Act, PRC, Section 2690–2699. The Seismic Hazards Mapping Act (SHMA) of 1990 directs the California Department of Conservation, California Geological Survey (CGS), to delineate Seismic Hazard Zones. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards to buildings intended for human occupancy. Seismic Hazard Zone maps created under this act are available for select quadrangles throughout California and pertain to liquefaction hazards and earthquake-induced landslide hazards. Cities, counties, and State agencies are directed to use seismic hazard zone maps developed by CGS, where available, in their land-use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting applicable projects within seismic hazard zones.

California Building Code. The California Building Code, Title 24, Part 2 (CBC, 2013) provides building codes and standards for design and construction of structures in California, and may be relevant to the geology and soils within the project. The 2013 CBC is based on the 2012 International Building Code with the addition of more extensive structural seismic provisions. Certain facilities for the project may be subject to the requirements of Chapters 16 and 18 of the CBC, which contain provisions for soil lateral loads, earthquake loads, geotechnical investigations, excavations, grading, fill, and foundations. Chapter 33 of the CBC contains requirements for safeguards during construction that may apply to grading for new facilities. Appendix J of the CBC contains requirements for grading.

California Geological Survey. The CGS, formerly known as the California Division of Mines & Geology, provides scientific products and services regarding the State's geology, seismology and mineral resources that affect the health, safety, and business interests of the people of California. Their Seismic Hazards Program (SHP) provides technical information and advice to the Division of the State Architect (DSA) and the Office of Statewide Health, Planning, and Development (OSHPD) regarding geologic hazards. The Building Official for public schools is the Division of the State Architect (DSA). Hospitals and

Skilled Nursing Facilities in California are under the jurisdiction of the Office of Statewide Health Planning & Development (OSHPD). CGS serves under contract with these two State agencies. The Seismic Hazards Program (SHP) provides technical information and advice regarding geologic hazards to local jurisdictions to aid in the preparation of environmental review documents and/or the hazard element of a given region's general plan.

California Division of Oil, Gas, and Geothermal Resources. The California Division of Oil, Gas, and Geothermal Resources (DOGGR) regulates production of oil and gas, as well as geothermal resources, within the State of California. DOGGR requirements in preparation of environmental documents under CEQA are defined in CCR, Title 14, Division 2, Chapter 2. DOGGR regulations, which are defined in CCR, Title 14, Division 2, Chapter 4, include well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines. DOGGR regulates well abandonment procedures to ensure effectiveness in preventing migration of oil and gas from a producing zone to shallower zones, including potable groundwater zones. DOGGR oversees well operations. DOGGR also has regulatory authority over Class II injection wells for enhanced recovery and disposal. In California, the operation of all Class II injection wells are regulated by DOGGR, under provisions of CCR Sections 1724.6, 1724.7, 1724.9 and 1724.10, and the Federal Safe Drinking Water Act. When an operator ceases well operation or production, State law requires the well is abandoned within a reasonable time period. Regulations require well operators to maintain detailed records of abandonment operations and file copies with the DOGGR. In addition, DOGGR regulates environmentally sensitive pipelines and production facilities, which are defined under CCR Title 14, Sections 1760(e), 1760(j), and 1760(k).

Under Senate Bill 4, hydraulic fracturing and fluid disposal are regulated by DOGGR through permit applications for well stimulation. Oil and gas developers are required to comply with DOGGR's Well Stimulation Treatment Regulations, Section 1785.1, to monitor and cease hydraulic fracturing activities if an earthquake of Magnitude 2.7 or greater occurs within a radius of five times the fracture length from each point of fracture (DOC, 2015).

Local

City and county planning and building departments may have requirements for geotechnical and engineering geology investigations for hillside projects requiring grading and slope stability analysis. City and County General Plans are required to have a "safety element" that is intended to protect the community by identifying seismic hazards, (seismically induced surface rupture, ground shaking, and ground failure), and other geologic hazards including landslides and potentially unstable slopes.

Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation, as required in the CBC, Title 24, Part 2, Chapter 18. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific improvements in the project that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.

Many counties and cities in the CCFO Planning Area have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of SWPPP related BMPs.

3.3.3 Regional Setting

Regional Geologic Setting

The CCFO Planning Area in situated in the southern portion of the Coast Ranges Geomorphic Province, characterized by northwest trending mountain ranges and intervening valleys; the eastern edge of the San Joaquin Management Area extends into the Great Valley Geomorphic Province. Franciscan assemblage rocks mapped as mélange, metavolcanic rock, greenstone, serpentinite, and gabbro form the basement terrane east of the San Andreas Fault. Granitic rock of the Salinian block form the basement west of the fault. The Salinian Block is comprised of Mesozoic granitic rock and Paleozoic to Mesozoic age meta-sedimentary rock (Norris & Webb, 1976). A narrow, far western basement terrane, again comprised of Franciscan Complex rocks, is located along the coast west of the Sur-Nacimiento fault,

Two main fault systems in the Coast Ranges juxtapose the basement terranes of different origins. The east part of the province is dominated by the San Andreas Fault and further west by the Sur-Nacimiento and Hosgri fault system, including the Rinconada fault. The Hayward and Calaveras faults, part of the San Andreas fault system, dominate the structural geology east of San Francisco Bay. A thick series of Jurassic-age through Tertiary-age sedimentary strata overlie much of the Franciscan basement and the Salinian block, and were deposited during marine transgressions and regressions during this timeframe. Several episodes of volcanism, indicative of crustal extension and normal faulting, occurred in some areas of the Coast Ranges during late Oligocene, Miocene, and Pliocene time, and produced shallow intrusive and volcanic deposits. Pinnacles National Park presents exposures of Miocene age shallow volcanic intrusives and pyroclastic breccia of rhyolitic composition. During Quaternary time, the region was uplifted to its current elevation and a combination of tectonic and geomorphic processes have shaped the present landscape, including the exposure of marine terraces, deposition of dune sand, and alluvial deposition which predominate in the large valleys (Salinas, San Joaquin, and Santa Clara).

3.3.4 Current Conditions and Trends

Faulting and Seismicity

The CCFO Planning Area is located in a seismically active area, as is the majority of southern California. The numerous faults in southern California include active, potentially active, and inactive faults. Active faults have ruptured during the Holocene (approximately last 11,000 years), potentially active or Quaternary faults show evidence of movement in the last 1.6 million year; and inactive or pre-Quaternary age faults show no displacement in the last 1.6 million years (CGS, 2010).

Within the CCFO Planning Area and BLM jurisdictional lands active faults are designated as Alquist-Priolo Fault Zones include the San Andreas, Calaveras, Hayward, San Gregorio, San Simeon, and Ortigalita faults. Also, there are many Quaternary and pre-Quaternary faults present within the CCFO Planning Area. Fault geometries in the Planning Area are mainly strike slip, reverse, and oblique. The 1906 San Francisco and 1989 Loma Prieta earthquakes are associated with the San Andreas fault system and were responsible for extensive damage in and around San Francisco Bay area. The San Simeon 2003 earthquake occurred on a previously unknown blind thrust fault (Hardebeck et al., 2004).

Faults can either act as traps for hydrocarbons or they can act as conduits for flow depending upon the nature of the fault. Consequently, oil fields and exploratory targets in California are frequently associated with faults (active and inactive).

Geologic & Seismic Hazards

Surface Rupture. Fault rupture hazard is based on recency of faulting and recurrence interval between earthquakes capable of causing surface rupture. Historically active faults (activity during the past 200 years) are more likely to have future activity and surface rupture than Holocene active or Quaternary

faults. In general, future faulting and surface rupture is most likely to occur on active faults. Many earthquakes occur without surface rupture and can result in significant damage to buildings and infrastructure. Surface rupture along faults could result in significant damage to oil field facilities including access roads, pipelines, and storage tank batteries.

Seismic Ground Shaking. Seismic ground shaking is the response to earth ground motions caused by the release of energy at the earthquake epicenter. The duration and intensity of the ground shaking is a function of the earthquake magnitude and distance from the earthquake epicenter. Large magnitude earthquakes on active faults in the CCFO Planning Area would result in strong and locally very strong ground shaking. Probabilistic determination of Peak Ground Acceleration (PGA) for the Planning Area ranging from 0.30 to 1.00g (30 to 100 percent of the acceleration due to gravity) should be anticipated during an earthquake in the next 50 years (2 percent probability of exceedance in 50 years). The largest PGAs are likely to occur along the San Andreas fault zone (USGS, 2015).

Liquefaction. Liquefaction is the phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced strong ground shaking. The susceptibility of a site to liquefaction is a function of the depth, density, pressure, and water content of the granular sediments and the magnitude and frequency of earthquakes in the surrounding region. Saturated, unconsolidated silts, sands, and silty sands within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction-related phenomena include lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects (Youd and Perkins, 1978). In addition, densification of the soil resulting in vertical settlement of the ground can also occur.

In order to determine liquefaction susceptibility of a region, three major factors must be analyzed. These include: (a) the density and textural characteristics of the alluvial sediments; (b) the intensity and duration of ground shaking; and (c) the depth to groundwater. Potentially liquefiable granular sediments of loose to medium density likely occur in the alluvium-filled valleys throughout the CCFO Planning Area. Salinas Valley and Santa Clara Valley present a liquefaction hazard, although no oil drilling activities are anticipated in these areas. Potential liquefaction hazard is not a consideration for portions of the Planning Area underlain by shallow bedrock, which is typical of the elevated areas in mountain ranges.

Landslides. Landslides and other seismically induced ground failures which may affect the CCFO Planning Area site include ground cracking, shattered ridgetops, and seismically induced landslides. Landslides triggered by earthquakes have been a considerable cause of earthquake damage; in central California large earthquakes such as the 1906 San Francisco and 1989 Loma Prieta earthquakes triggered landslides or slope failures that were responsible for destroying or damaging numerous structures, blocking major transportation corridors, and damaging life-line infrastructure. Areas that are most susceptible to earthquake-induced landslides are steep slopes in poorly cemented or highly fractured rocks, areas underlain by loose, weak soils, and areas on or adjacent to existing landslide deposits. Areas that are underlain by landslide prone units with moderate to steep slopes, and previously existing landslides, both mapped and unmapped, are particularly susceptible to this type of ground failure. Shattered ridgetop features consist of fractures, fissures, and minor slumps that are concentrated on narrow ridgelines. Studies suggest that amplification of ground motion at ridge tops is frequency dependent, potentially leading to differential motion at the top of the ridge, which produces cracks and fissures at the crest.

Oil well sites located in hillside areas within the CCFO Planning Area could be located in landslide and seismically induced landslide areas.

Expansive Soils. Expansive soils are characterized by their ability to undergo significant volume change (shrink and swell) due to variation in soil moisture content. Changes in soil moisture could result from a number of factors, including rainfall, landscape irrigation, utility leakage, and/or perched groundwater. Expansive soils are typically fine grained with a high percentage of clay particles (particularly smectite clay). The heaving pressures associated with soil expansion can damage structures, flatwork, and pipe-

lines. Clayey soils may be encountered throughout the CCFO Planning Area. The expansion characteristics of clayey soils may vary locally and should thus be evaluated on a site-specific basis. Such an evaluation may include laboratory testing.

Land Subsidence. Land subsidence can be induced by any one of several different activities that involve large volume extraction of underground resources (water, oil and gas, sulfur, salt). Land loss associated with induced subsidence is common, especially where large volumes of fluids are removed from underground formations. This induced subsidence, which is either sub-regional or local in extent, has its greatest impact on flat coastal plains and wetlands near sea level where minor lowering of the land surface results in permanent inundation. Areas in the CCFO Planning Area could be susceptible to land subsidence.

Central Coast Field Office Planning Area

Key geologic hazard issues in the CCFO Planning Area are fault rupture, strong ground shaking, and landslides. Liquefaction is not anticipated at oil well sites or existing oil fields where the project area is underlain by semi-consolidated Tertiary age deposits, older bedrock, and groundwater depths greater than 50 feet. Expansive soils could be present at many oil well sites and existing oil fields and could cause pipeline damage or heave of building and tank foundations. Existing oil fields in the Planning Area are not directly adjacent to or across the San Andreas fault or other active faults, although surface rupture cannot be entirely dismissed. Strong ground shaking should be anticipated to occur at any of the active oil fields and exploratory well sites in the CCFO Planning Area. Finally, the moderate to locally steep terrain that occurs in some oil fields and that is sometimes composed of younger, poorly consolidated, or weak rock would be especially prone to landslides and slope failure. The majority of landslide hazard areas within the CCFO Planning Area that have been mapped by the California Geological Survey are located near the coast within Santa Cruz and Monterey Counties and on the hills surrounding the San Francisco Bay (CGS, 2015). Specific landslide areas would be identified and avoided or stabilized prior to any new construction activity.

Leases Subject to Settlement Agreement

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in moderately sloping hillside areas underlain by sedimentary formations that may be susceptible to landslides. Grading for new access roads and drill pads could encounter existing landslides or destabilize slopes with weak soil or bedrock. Several leases west of San Ardo are located across the potentially active late-quaternary Rinconada fault. New access roads, drill pads, and gathering lines could experience fault rupture hazard during an earthquake. Both the west of San Ardo and Vallecitos field locations would experience strong ground shaking from an earthquake on the Rinconada or San Andreas faults. Although these leases either have not been issued or have been suspended, it is possible that some or all of the 37 exploratory or development wells could be drilled on these leases in the future and could be affected by these geologic hazards.

3.4 Hazardous Materials and Public Safety

3.4.1 Introduction

As managers of the nation's public lands, the Bureau of Land Management (BLM) is responsible for the health and safety of visitors to public lands. This section addresses hazardous materials management on BLM-managed lands as well as associated risks to the public.

Public lands located within the four management areas of BLM's Central Coast Field Office (CCFO) have historically been used for a variety of military, industrial, and commercial uses and, occasionally, illegal activities. Use of these lands, both legal and illegal, has resulted in the release of hazardous substances and the creation of hazardous waste sites. Some examples of sources of hazardous materials on public lands include abandoned mine facilities and landfills, illegal dumping of hazardous materials, unexploded ordnance, and physical safety hazards associated with abandoned structures, oil spills, wire burns, cast-away equipment and radioactive material (BLM, 2015a). Other sources of hazardous materials within the CCFO Planning Area include naturally occurring materials, such as asbestos found in serpentine soils and mercury, chromium, and other heavy metals found in soils surrounding past mining operations (BLM, 2013). These materials also can be found at a distance from past mining operations because some of these naturally occurring hazardous materials have been eroded and transported via stormwater runoff to downstream depositional areas (BLM, 2013).

Through the Hazard Management and Resource Restoration (HMRR) Program commonly known as Hazardous Materials Management (HAZMAT), the CCFO engages in hazardous material emergency response actions, hazardous waste site evaluations, and prioritization of site remediation activities in accordance with Federal, State, and local laws and regulations. Remediation is typically done in coordination with the U.S. Environmental Protection Agency (EPA), California environmental regulatory agencies such as the Department of Toxic Substances Control and the Regional Water Quality Control Boards, counties, and potentially responsible parties (both public and private). As part of the HMRR, hazardous material sites are inventoried in the Abandoned Mine – Site Cleanup Module (AMSCM) database system (BLM, 2015b). This database helps to track and prioritize cleanup activities for identified hazardous material sites.

Section 3.4.2 presents relevant State and Federal regulations and standards associated with Hazardous Materials and Public Safety. Section 3.4.3 provides a description of the regional setting for Hazardous Materials and Public Safety. Section 3.4.4 provides a description of current conditions and trends in the CCFO Planning Area. Please refer to Section 4.4 for a summary of the direct and indirect impacts of the RMPA and the Hazardous Materials and Public Safety evaluation of the RMPA alternatives.

3.4.2 Regulatory Framework

This section gives an overview of the Federal and State programs and regulations affecting hazardous materials generation, transportation, treatment, storage, and disposal, and for worker and public safety related to the risk of upset. Definitions of terms and details on the various regulatory programs appear in this section.

Types of Hazardous Substances

Hazardous substances are defined by Federal and State regulations that aim to protect public health and the environment. Hazardous materials have certain chemical, physical, or infectious properties that cause them to be considered hazardous. Hazardous substances are defined in the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 101(14), and also in the California Code of Regulations (CCR), Title 22, Chapter 11, Article 2, Section 66260 et seq.

In this analysis, chemicals mobilized and/or used at a site and released to the environment may result in their being considered a hazardous waste if the level of contamination exceeds specific CCR Title 22 criteria or criteria defined in CERCLA or other relevant Federal regulations. California has similar laws and regulations for the handling, storage, and discovery of hazardous substances, as well as cleanup and disposal of hazardous materials and wastes. Cleanup and safe removal/disposal of hazardous wastes, including contaminated soil from prior oil production activities can be required if excavation of these materials becomes required. Even if soils or groundwater at a contaminated site do not have the characteristics required to be defined as hazardous wastes, remediation of the site may be required by regulatory agencies subject to jurisdictional authority. Cleanup requirements are determined on a case-by-case basis by the agency taking lead jurisdiction.

Overview of Federal Regulations

The Federal Toxic Substances Control Act of 1976 and the Resource Conservation and Recovery Act (RCRA) established a program administered by the U.S. EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. The use of certain techniques for the disposal of some hazardous wastes was specifically prohibited by HSWA.

CERCLA, including the Superfund program, was enacted by Congress on December 11, 1980. This law provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified. CERCLA also enabled the revision of the National Oil and Hazardous Substances Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants, spill containment, and cleanup. The NCP also established the National Priorities List. CERCLA was amended by the Superfund Amendments and Reauthorization Act on October 17, 1986.

The Spill Prevention, Control and Countermeasures Plan (SPCC) requires facilities that store, handle, or produce significant quantities of hazardous material to prepare plan to ensure that containment and countermeasures are in place to prevent release of hazardous materials to the environment.

Federal Hazardous Liquid Pipeline Safety Act

Hazardous liquid pipelines are under the jurisdiction of the U.S. Department of Transportation (USDOT) and must follow the regulations in 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline, as authorized by the Hazardous Liquid Pipeline Safety Act of 1979 (49 USC Sections 60101–60133). Other important Federal requirements are contained in 40 CFR Parts 109, 110, 112, and 113, which pertain to the need for Oil SPCC Plans and were promulgated in response to the Oil Pollution Act of 1990, as well as the Outer Continental Shelf Lands Act.

Overview of Requirements in 49 CFR Part 195. Part 195.3 incorporates many of the applicable national safety standards of the:

- American Petroleum Institute (API)
- American Society of Mechanical Engineers (ASME)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)

Part 195.49 requires, beginning no later than June 15, 2005, that each operator must annually complete and submit to the USDOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) form PHMSA F 7000–1.1 for each type of hazardous liquid pipeline facility operated at the end of the previous year. A separate report is required for crude oil, highly volatile liquids (HVL) including anhydrous ammonia, petroleum products, carbon dioxide pipelines, and fuel grade ethanol pipelines.

Part 195.50, amended in 2002, requires reporting of accidents by telephone and in writing for:

- Explosion or fire not intentionally set by operator.
- Spills of greater than 5 gallons of a hazardous liquid, or 5 barrels if associated with a maintenance activity that meets four criteria (including confinement to company property and immediate clean-up).
- Death or serious injury of a person requiring hospitalization.
- Damage to property of operator or others, greater than $50,000, including clean-up costs.

The Part 195.100 series includes design requirements for the temperature environment, variations in pressure, internal design pressure for pipe specifications, external pressure and external loads, new and used pipe, valves, fittings, and flanges.

The Part 195.200 series highlights construction requirements for standards such as compliance, inspections, welding, siting and routing, bending, welding and welders, inspection and nondestructive testing of welds, external corrosion protection and cathodic protection, installing in ditch and covering, clearances and crossings, valves, pumping, breakout tanks, and construction records.

The Part 195.300 series indicates the minimum requirements for hydrostatic testing, compliance dates, test pressures and duration, test medium, and records.

The Part 195.400 series specifies minimum requirements for operating and maintaining steel pipeline systems, including:

- Correction of unsafe conditions within a reasonable time
- Procedural manual for operations, maintenance, and emergencies
- Emergency Response Training
- Maps and Records
- Maximum operating pressure
- Communication system
- Cathodic protection system
- External and internal corrosion control
- Continued evaluation and assessment to maintain pipeline integrity (including method and test interval)
- Valve maintenance
- Pipeline repairs
- Overpressure safety devices
- Firefighting equipment
- Public education program for hazardous liquid pipeline emergencies and reporting

Overview of Requirements in 40 CFR Parts 109, 110, 112, 113, and 146.5. The SPCC plan requirements covered in these regulatory programs applies to oil storage and transportation facilities and terminals, tank farms, bulk plants, oil refineries, and production facilities, as well as bulk oil consumers such as apartment houses, office buildings, schools, hospitals, farms, and State and Federal facilities.

Part 109 establishes the minimum criteria for developing oil removal contingency plans for certain inland navigable waters by State, local, and regional agencies in consultation with the regulated community (oil facilities).

Part 110 prohibits discharge of oil such that applicable water quality standards would be violated, or that would cause a film or sheen upon or in the water. These regulations were updated in 1987 to adequately reflect the intent of Congress in Section 311(b)(3) and (4) of the Clean Water Act (CWA).

Part 112 deals with oil spill prevention and preparation of SPCC Plans. These regulations establish procedures, methods, and equipment requirements to prevent the discharge of oil from onshore and offshore facilities into or upon the navigable waters of the United States. Current wording applies these regulations to facilities that are non-transportation-related. These rules should be used by pipeline operators as additional guidelines for the development of oil spill prevention, control and emergency response plans.

Part 113 establishes financial liability limits; however these limits were preempted by the Oil Pollution Act (OPA) of 1990.

40 CFR 146.5 classifies injection wells according to the six types described below:

- ***Class I Injection Wells:***

  1. *Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter (1/4) mile of the well bore, an underground source of drinking water.*
  2. *Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.*
  3. *Radioactive waste disposal wells which inject fluids below the lowermost formation containing an underground source of drinking water within one quarter mile of the well bore.*

- ***Class II Injection Wells. Wells which inject fluids:***

  1. *Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.*
  2. *For enhanced recovery of oil or natural gas; and*
  3. *For storage of hydrocarbons which are liquid at standard temperature and pressure.*

- ***Class III Injection Wells. Wells which inject for extraction of minerals including:***

  1. *Mining of sulfur by the Frasch process;*
  2. *In situ production of uranium or other metals. This category includes only in-situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V.*
  3. *Solution mining of salts or potash.*

- ***Class IV Injection Wells:***

  1. *Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which within 0.25 mile of the well contains an underground source of drinking water.*
  2. *Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation which within 0.25 mile of the well contains an underground source of drinking water.*

3. *Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under Section 146.05(a)(1) or Section 146.05(d) (1) and (2), (e.g., wells used to dispose of hazardous wastes into or above a formation which contains an aquifer which has been exempted pursuant to Section 146.04).*

- ***Class V Injection Wells:*** *Injection wells not included in Class I, II, III, IV or VI.*
- ***Class VI Injection Wells:*** *Wells that are not experimental in nature and that are used for geologic sequestration of carbon dioxide beneath the lowermost formation containing a Underground Source of Drinking Water (USDW); or wells used for geologic sequestration of carbon dioxide that have been granted a waiver of the injection depth requirements pursuant to requirements at Section 146.95; or wells used for geologic sequestration of carbon dioxide that have received an expansion to the areal extent of an existing Class II enhanced oil recovery or enhanced gas recovery aquifer exemption pursuant to Section 146.4 and 144.7(d) of EPA 40 CFR 146.5.*

Oil Pollution Act of 1990 OPA. Public Law 101-380, 104 Stat. 484 (August 18, 1990). In the case of U.S. waters defined by the CWA and the Army Corp of Engineers, the Oil Pollution Act of 1990, together with the Oil Pollution Liability and Compensation Act of 1989, builds upon Section 311 of the CWA to create a single Federal law providing cleanup authority, penalties, and liability for oil pollution. The bill creates a single fund to pay for removal of and damages from oil pollution. This new fund replaces those created under the Trans-Alaska Pipeline Act, Deep Water Port Act of 1974, and Outer Continental Shelf Lands Act, and supersedes the contingency fund established under Section 311 of CWA. The law may also apply if a connection can be established between the location of the spill and a water of the U.S.

The Oil Pollution Act of 1990 establishes the Oil Spill Liability Trust Fund. It makes the responsible party for a vessel or facility from which oil is discharged (or which poses a substantial threat of discharge) liable for removal costs and for economic or natural resource damages, including:

- Injury or loss of real or personal property or natural resources;
- Loss of use (including subsistence use) of natural resources;
- Loss or impairment of income, profits, or earning capacity;
- Loss of Federal and State tax, royalty, rental, or net profits share revenue; and
- Net costs of increased public services as a result of the discharge.

The Oil Spill Liability Trust Fund will be available, up to a limit of $1 billion per incident, for removal costs and compensatory damages. The act provides for liability and availability of the fund to pay removal costs and compensation in case of discharges of oil.

Hazardous Waste Handling Regulations

RCRA directs the U.S. EPA to develop a comprehensive set of regulations to implement the law. The hazardous waste program, under RCRA Subtitle C, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal. 40 CFR Parts 260-273 contain all of the RCRA regulations governing hazardous waste identification, classification, generation, management and disposal. The EPA approved California's program to implement Federal hazardous waste regulations on August 1, 1992.

Under RCRA, the EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. Hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health or the environment. In regulatory terms, RCRA hazardous wastes fall into two categories:

- Listed Wastes, which appear on one of the four hazardous wastes lists established by EPA regulations in 40 CFR Part 261, Subpart D
- Characteristic wastes, which exhibit one or more of four characteristics defined in 40 CFR Part 261, Subpart C

Hazardous Materials Risk Management

The Clean Air Act Amendments of 1990, Section 112(r) requires EPA to publish regulations and guidance for chemical accident prevention at facilities using substances that posed the greatest risk of harm from accidental releases (40 CFR Part 68). These regulations were built upon existing industry codes and standards and require companies of all sizes that use certain listed regulated flammable and toxic substances to develop a Risk Management Program, including a:

- Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental release scenarios; and
- Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures.

Transportation of Hazardous Materials

The USDOT issues the Hazardous Materials Regulations (HMR) found in 49 CFR Parts 171-181. These rules govern the transportation of hazardous materials in all modes of transportation: air, highway, rail and water. The Hazardous Materials Transportation Act requires that carriers report accidental releases of hazardous materials to USDOT at the earliest practical moment. Other incidents that must be reported include deaths, injuries requiring hospitalization, and property damage exceeding $50,000.

The Federal Railroad Administration (FRA) is a department within the USDOT. FRA adopts and enforces railroad safety regulations, including regulations relating to track safety, rail equipment, operating practices, and the transport of hazardous materials by rail. Rail facilities, including yard facilities, are inspected by the FRA to ensure compliance with regulations, and those adopted by the PHMSA. PHMSA is another department within the USDOT. Pursuant to the Hazardous Materials Transportation Act, PHMSA adopts regulations governing the transport of hazardous materials by rail, highway, air, and water. The PHMSA regulations are set forth in Chapter I of Subtitle B of 49 CFR (Parts 105 to 199).

The National Transportation Safety Board is an independent Federal agency that reviews transportation accidents, including rail accidents, and makes recommendations to FRA and PHMSA for regulatory changes.

The American Association of Railroads (AAR) is an industry trade association that represents railroads, including the major freight railroads in the United States, Canada, and Mexico. AAR adopts standards for the construction and design of tank cars which, in some cases, are more stringent than the requirements set forth in FRA or PHMSA regulations.

The PHMSA regulations classify hazardous materials based on each material's hazardous characteristics. Crude oil is assigned to hazard Class 3, based on specified characteristics of combustibility and flammability (49 CFR 173.120). In 2014, USDOT issued Emergency Order DOT-OST-2014-0025 to address crude oil transport by rail. Among other issues, the Emergency Order requires shippers to assign crude oil to Packing Groups I or II, thereby assuring that Bakken and other highly volatile crude oils cannot be mischaracterized and assigned to Packing Group III. The pertinent PHMSA regulations governing rail transport are summarized as follows:

- 49 CFR 172, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans, addresses numerous aspects of safe rail transport, including requirements pertaining to the hazardous materials classification of crude oil.
- 49 CFR 173, General Requirements for Shipments and Packages, addresses requirements for bulk packaging including the type of tank car a hazardous material must be transported in.
- 49 CFR 174, Carriage by Rail, specifies handling, loading, and unloading requirements for the safe transport and shipping of hazardous materials, which must be performed by qualified personnel.
- 49 CFR 176, Carriage by Vessel, provides additional details on vessel carriage requirements for different classes of hazardous materials.
- 49 CFR 179, Specifications for Tank Cars, provides construction and design standards requirements for rail tank cars including tank wall thickness, welding certification, tank mounting, pressure relief devices, thermal protection systems, protection of fittings, loading/unloading valve requirements, coupler vertical restraints systems and tank-head puncture-resistance systems.

Federal regulatory agencies and AAR have taken a variety of actions designed to reduce the risk of accidental releases from DOT-111 tank cars, in response to recent rail accidents involving crude oil and ethanol. On May 1, 2015, with a goal of reducing rail transportation risk, the U.S. Department of Transportation issued new rules for railroads hauling crude oil which include the use of sturdier rail cars and new braking systems.

Worker and Workplace Safety

Occupational Safety and Health Act Requirements

Congress passed the Occupational and Safety Health Act (OSHA) to ensure worker and workplace safety. Their goal was to make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions (along with Cal OSHA in California). OSHA regulations at 29 CFR 1910 contains several standards that describe requirements for the safe management of hazards associated with processes using, storing, manufacturing, handling, or moving highly hazardous chemicals onsite. It emphasizes the management of hazards through an established comprehensive program that integrates technologies, procedures, and management practices, including communication.

- 29 CFR 1910.119 (Subpart H) – Process Safety Management of Highly Hazardous Chemicals
- 29 CFR 1910.120 (Subpart H) – Hazardous waste operations and emergency response.
- 29 CFR 1910 (Subpart N) – Materials Handling and Storage

BLM Enjoined Final Rule on Hydraulic Fracturing on Federal and Indian Lands

In March 2015, the BLM issued a final ruling regarding hydraulic fracturing on Federal and Indian lands. The standards included in the rule update the requirements for well-bore integrity, wastewater disposal, and public disclosure of chemicals. The rule also includes a process to allow states and tribes to request a variance from provisions for which they have an equal or more protective regulation in place.

The rule includes the following key components which would apply to hazardous materials and public safety:

- Increased transparency by requiring companies to publicly disclose chemicals used in hydraulic fracturing to the BLM through the website FracFocus, within 30 days of completing fracturing operations;
- Higher standards for interim storage of recovered waste fluids from hydraulic fracturing to mitigate risks to air, water, and wildlife; and

- Measures to lower the risk of cross-well contamination with chemicals and fluids used in the fracturing operation, by requiring companies to submit more detailed information on the geology, depth, and location of preexisting wells to afford the BLM an opportunity to better evaluate and manage unique site characteristics.

BLM Guidelines and BLM Gold Book

BLM has spill cleanup guidelines for heavy crude oil releases in California (2002). The guidelines include clean-up of spills on developed surfaces and on undeveloped surfaces and sensitive areas. The guidelines were developed for heavy crude oil spills. Emergency response to releases of light crude oil and other hazardous materials are regulated by 40 CFR Part 300 and corresponding California regulations.

The BLM Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (known as the Gold Book) includes a section regarding pollution control and hazardous wastes including the spill requirements. All spills or leakages of oil, gas, saltwater, toxic liquids or waste materials, blowouts, fires, personal injuries, and fatalities shall be reported by the operator to the BLM and the surface management agency in accordance with the requirements of Notice to Lessees NTL-3A; Reporting of Undesirable Events, and in accordance with any applicable local requirements.

BLM Best Management Practices

Best Management Practices (BMPs) are those land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to provide the most effective, environmentally sound, and economically feasible means of managing an activity and mitigating its impacts. BMPs are identified as part of the National Environmental Policy Act (NEPA) process, with interdisciplinary involvement.

The BMPs that appear in Appendix D are a compilation of existing policies and guidelines and commonly employed practices designed to assist in achieving the objectives for maintaining or minimizing water quality degradation from nonpoint sources, loss of soil productivity, providing guidelines for aesthetic conditions within watersheds, and mitigating impacts to soil, vegetation, or wildlife habitat from surface disturbing activities. BMPs are selected and implemented as necessary, based on site-specific conditions, to meet a variety of resource objectives for specific management actions. Where necessary, additional BMPs or modifications may be identified to minimize the potential for negative impacts when evaluating site-specific management actions through BLM's interdisciplinary process.

The BLM Mineral Exploration and Development BMP (Appendix D 1.6.2) requires that operators obtain all required State and Federal permits for the protection of groundwater and surface water quality. Additional measures to protect water resources that may be included as Conditions of Approval (COAs) are described in Section 1.8.2. COAs specifically designed to protect groundwater include zone isolation, general casing depth and cement requirements, pressure testing, casing integrity testing, fluid surveys, and/or wellhead monitoring.

Overview of State Regulations

The California Environmental Protection Agency (CalEPA) was created in 1991, which unified California's environmental authority in a single cabinet-level agency and brought the Air Resources Board, State Water Resources Control Board, Regional Water Quality Control Boards, Department of Resources Recycling and Recovery (CalRecycle), Department of Toxic Substances Control (DTSC), Office of Environmental Health Hazard Assessment, and Department of Pesticide Regulation under one agency. These agencies were placed within the CalEPA "umbrella" for the protection of human health and the environment and to ensure the coordinated deployment of State resources. Their mission is to restore, protect and enhance the environment, to ensure public health, environmental quality, and economic vitality.

The California Hazardous Waste Control Law (HWCL) is administered by CalEPA to regulate hazardous wastes. While the HWCL is generally more stringent than RCRA, both the State and Federal laws apply in California. The HWCL lists 791 chemicals and about 300 common materials that may be hazardous; establishes criteria for identifying, packaging and labeling hazardous wastes; prescribes management controls; establishes permit requirements for treatment, storage, disposal and transportation; and identifies some wastes that cannot be disposed of in landfills.

DTSC is a department of CalEPA and is the primary agency in California that regulates hazardous waste, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California. DTSC has authority under RCRA and the California Health and Safety Code (HSC). California's hazardous waste laws and regulations as implemented by DTSC are contained in HSC Division 20, Chapter 6.5, and CCR Title 22, Division 4.5. Activities subject to DTSC oversight include the generation, storage, treatment and disposal of hazardous waste and regulates cleanup of contaminated sites in the State, including industrial sites with soil and groundwater contamination. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

The California Occupational Safety and Health Administration (Cal/OSHA) is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. Cal/OSHA standards are generally more stringent than Federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR Sections 337 340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and hazardous substance exposure warnings. On-site oil-field workers and oil-field support workers generally are required to have site-specific hazardous materials/chemical safety training both for preventative and emergency response actions. Such training sometimes is referred to as Hazardous Waste Operations and Emergency Response (HAZWOPER) training. Because some site workers could be exposed to chemicals above the permissible exposure limit (PEL), general site workers must have training covering use of personal protective equipment, respiratory protection, and understanding of hazardous materials and toxicities. General site workers require 40 hours of training plus 24 hours of on the job training with an annual refresher (within 365 days after the initial training) to maintain valid certification. Site supervisors require the same 40-hour training and 24 hours on the job training plus an additional 8 hours of training as a HAZWOPER Supervisor. Subcontractors who are on the site on an occasional basis but remain outside area(s) where the chemical exposure could be above the PEL, would be trained as Occasional Site workers, requiring 24 hours of training plus 8 hours on the job training. In addition to HAZWOPER, many oil companies have their own worker health and safety training programs. These address risks from releases such as tanks, equipment, and pipeline ruptures and leaks and fire and explosion hazards.

California's Department of Conservation (DOC), Division of Oil, Gas and Geothermal Resources (DOGGR) regulations (California Code of Regulations, Title 14, Section 1722.9) require that oil and gas well operators develop and maintain a spill contingency plan to prevent and respond to unauthorized releases. In addition, secondary containment for any container with hazardous fluids is required (Section 1773.1). The secondary containment requirement does not apply to various conveyance components such as lines, valves, etc. Spill contingency plans must include a list of all chemicals used on a site for which a Material Safety Data Sheet (MSDS) exists.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal OSHA)

Cal OSHA protects workers from health and safety hazards on the job through its research and standards, enforcement, and consultation programs, through Title 8.

California Accidental Release Prevention (CalARP)

The California Accidental Release Prevention is based on the EPA's Risk Management Program, but it made it more stringent for California. Similar to the EPA Risk Management Program, the CalARP is a performance based regulation that has different prevention elements for different program levels. According to the CalARP, stationary sources with more than a threshold quantity of a regulated substance shall be evaluated to determine the potential for and impacts of accidental releases from that covered process.

California Pipeline Safety Act of 1981

This act gives regulatory jurisdiction to the California State Fire Marshal (CSFM) for the safety of all intrastate hazardous liquid pipelines and all interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations.

Overview of California Pipeline Safety Regulations

The California Government Code (Parts 51010 through 51019.1) provides specific safety requirements that are more stringent than the Federal rules. The requirements that go beyond 49 CFR Part 195 which are required by incorporation include:

- Periodic hydrostatic testing of pipelines, with specific accuracy requirements on leak rate determination.
- Hydrostatic testing by State-certified independent pipeline testing firms.
- Pipeline leak detection.
- Reporting of all leaks required.

Recent amendments require pipelines to include means of leak prevention and cathodic protection, with acceptability to be determined by the State Fire Marshal. All new pipelines must also be designed to accommodate passage of instrumented inspection devices (smart pigs) through the pipeline.

California Coastal Commission

The California Coastal Act of 1976 (PRC Division 20) created the California Coastal Commission, which is charged with the responsibility of granting development permits for within the legally defined California Coastal Zone and for determining consistency between Federal and State coastal management programs. Section 30232 of the Coastal Act addresses hazardous material spills and states that "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."

Sections 30260, 30262 and 30265 require that adverse environmental effects be mitigated to the maximum extent feasible, that new and expanded oil and gas facilities be consolidated and that platforms not be sited where a substantial hazard to vessel traffic might result from the facility or related operations. Section 30265 finds that pipeline transport of oil is generally both economically feasible and environmentally preferable to other forms of crude oil transport.

Also in 1976, the State legislature created the California State Coastal Conservancy to take steps to preserve, enhance, and restore coastal resources and to address issues that regulation alone cannot resolve.

California State Lands Commission (CCR Title 2, Division 3, Chapter 1)

The California State Lands Commission (CSLC) was established in 1938 with authority detailed in PRC Division 6. Title 2, Division 3, Chapter 1 (Articles 1 through 13) addresses the requirements related to leasing and permits, oil and gas operations, mineral resource regulations, and marine terminal regulations.

Article 3.4 specifically addresses pollution control, disposal of drilling muds and cuttings and the oil spill contingency plan. Article 3.4 specifically requires the development of an operating manual. Article 3 specifically addresses the operating requirements, such as tankage, laboratory testing, drilling operations and offshore operations. Article 3.2 and 3.3 address specifics related to drilling and production activities.

California Regulations for Well Stimulation Treatments (Senate Bill 4)

Under existing law, DOGGR in the Department of Conservation, regulates the drilling, operation, maintenance, and abandonment of oil and gas wells in the State. The State Oil and Gas Supervisor supervises the drilling. Regulations in Title 14 of the California Code of Regulations (CCR) under Senate Bill 4 (SB 4) define, among other things, the terms well stimulation treatment, hydraulic fracturing, and hydraulic fracturing fluid. Public disclosures of chemical constituents of well stimulation fluids are also required.

California Oil Pipeline Environmental Responsibility Act of 1995 (Assembly Bill 1868)

This legislation requires each pipeline corporation qualifying as a public utility that transports crude oil in a public utility oil pipeline system to be strictly liable for any damages incurred by "any injured party which arise out of, or caused by, the discharge or leaking of crude oil or any fraction thereof...." The law only applies to public utility pipelines for which construction would be completed after January 1, 1996, or that part of an existing utility pipeline that is being relocated after the above date and is more than 3 miles in length. The major features of the law include:

- Each pipeline corporation that qualifies as a public utility that transports any crude oil in a public utility oil pipeline system shall be absolutely liable without regard to fault for any damages incurred by any injured party that arise out of, or are caused by, the discharge or leaking of crude oil.
- Damages for which a pipeline corporation is liable under this law are:
  - All costs of response, containment, cleanup, removal, and treatment including monitoring and administration cost.
  - Injury or economic losses resulting from destruction of or injury to, real or personal property.
  - Injury to, destruction of, or loss of, natural resources, including but not limited to, the reasonable cost of rehabilitating wildlife habitat, and other resources and the reasonable cost of assessing that injury, destruction, or loss, in any action brought by the State, county, city, or district.
  - Loss of taxes, royalties, rents, use, or profit shares caused by the injury, destruction, loss, or impairment of use of real property, personal property, or natural resources.
  - Loss of use and enjoyment of natural resources and other public resources or facilities in any action brought by the State, county, city, or district.
- A pipeline corporation shall immediately cleanup all crude oil that leaks or is discharged from a pipeline.
- No pipeline system subject to this law shall be permitted to operate unless the State Fire Marshal certifies that the pipeline corporation demonstrates sufficient financial responsibility to respond to the liability imposed by this section. The minimum financial responsibility required by the State Fire Marshal shall be $750 times the maximum capacity of the pipeline in the number of barrels per day up to a maximum of $100 million per pipeline system, or a maximum of $200 million per multiple pipeline systems. For the Pacific Pipeline, the legislation specifically requires $100 million for the financial responsibility (Section l.h(l)).
- Financial responsibility shall be demonstrated by evidence that is substantially equivalent to that required by regulations issued under Section 8670.37.54 of the Government Code, including insurance, surety bond, letter of credit, guaranty, qualification as a self-insurer, or combination thereof or any other evidence of financial responsibility. The State Fire Marshal shall require the documentation evidencing financial responsibility to be placed on file with that office.

- The State Fire Marshal shall require evidence of financial responsibility to fund post closure cleanup spots. The evidence of financial responsibility shall be 15 percent of the amount of financial responsibility stated above.

California Oil Spill Prevention and Response

The Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (OSPRA) enacted by the California Legislature in 1990 requires a State oil spill contingency plan to protect marine waters and empowers a deputy director of the Department of Fish and Wildlife to take steps to prevent, remove, abate, respond, contain and clean up oil spills. Notification of all oil spills in the marine environment, regardless of size, is required to the Office of Emergency Services, which in turn notifies the response agencies. Oil Spill Contingency Plans must be prepared and implemented. The Act created the Oil Spill Prevention and Administration Fund and the Oil Spill Response Trust Fund. Pipeline operators will pay fees into the first of these funds for pipelines transporting oil into the State across, under, or through marine waters. The Act also directs some authority to the California Coastal Commission.

In 2014, Senate Bill 861 expanded California's Oil Spill Prevention and Response program to cover all statewide surface waters at risk from oil spills from any source, including pipelines and the increasing shipments of oil transported by railroads. Under this law the Office of Spill Prevention and Response (OSPR) has the authority to implement spill preparedness and response requirements for inland oil spills. This bill applies to areas where there is a thread to State surface waters and includes pipelines, oil wells, railroads, and ships.

California Code of Regulations (CCR), Title 8

California Code of Regulations Title 8, Section 6533 refers to the following regulations and standards to prevent crude oil and produced gas releases:

- CCR Title 8, Subchapter 7, Article 146 of the General Industry Safety Orders;
- American Society of Mechanical Engineers ASME B31.3 2002, Process Piping;
- ASME B31.4-2002, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids;
- ASME B31.8-2003, Gas Transmission and Distribution Piping Systems; or American Petroleum Institute (API) 1104, Nineteenth Edition, September 1999, Welding of Pipelines and Related Facilities (including the October 31, 2001 Errata).

Regulations of the Division of Occupational Safety and Health of Cal/OSHA, lists six Title 8 regulations that are applicable with regard to Valley Fever protection:

- 342 – Reporting Work-Connected Fatalities and Serious Injuries
- 3203 – Injury and Illness Prevention
- 5141 – Control of Harmful Exposures
- 5144 – Respiratory Protection
- 14300 – Employer records Log300
- 5145 – Media for Allaying Dusts, Fumes, Mists, Vapors and Gases

California State Fire Marshal

The California State Fire Marshal (CSFM) exercises safety regulatory jurisdiction over interstate and intrastate pipelines used for the transportation of hazardous or highly volatile liquid substances within California. In 1983, the Pipeline Safety and Enforcement Program was specifically created to administer this effort.

In 1987, CSFM acquired the regulatory responsibility for interstate lines when an agreement was executed with the United States Department of Transportation. In doing so, CSFM became an agent of the USDOT responsible for ensuring that California interstate pipeline operators meet Federal pipeline safety standards. Specifically, interstate pipelines under this agreement are subject to the Federal Pipeline Safety Act (49 USC Chapter 601) and Federal pipeline regulations.

CSFM's responsibility for intrastate lines is covered in the Elder California Pipeline Safety Act of 1981 (Chapter 5.5, California Government Code). The agency's responsibilities are twofold:

- To enforce Federal minimum pipeline safety standards over all regulated interstate hazardous liquid pipelines within California; and
- To enforce Federal minimum pipeline safety standards as well as the Elder California Pipeline Safety Act of 1981 on regulated hazardous liquid intrastate pipelines.

Other Recognized Industry Codes and Standards

Safety and Corrosion Prevention Standards: ASME, NACE, ANSI

- ASME & ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings.
- ASME & ANSI B16.9, Factory-Made Wrought Steel Butt Welding Fittings.
- ASME & ANSI B31.1, Power Piping.
- ASME & ANSI B31.4, "Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids."
- ASME & ANSI B31.8, "Gas Transmission and Distribution Piping Systems."
- NACE Standard RP-01-90, 95, Item No. 530.71 Standard Recommended Practice External Protective Coatings for Joints, Fittings, and Valves on Metallic Underground or Submerged Pipelines and Piping Systems.
- NACE Standard RP-01-6996, Item No. 53002. Standard Recommended Practice Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- API Guidance Document HF1, Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines, First Edition, October 2009
- API Guidance Document HF3, Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing, First Edition, January 2011
- API Specification 5B, Specification for Threading, Gauging, and Thread Inspection of Casing, Tubing, and Line Pipe Threads
- API Specification 5CT/ISO 11960, Specification for Casing and Tubing
- API Specification 7K, Specification for Drilling and Well Servicing Equipment
- API Specification 10A/ISO 10426-1, Specification for Cements and Materials for Well Cementing
- API Recommended Practice 10B-2/ISO 10426-2, Recommended Practice for Testing Well Cements
- API Recommended Practice 10D-2/ISO 10427-2, Recommended Practice for Centralizer Placement and Stop Collar Testing
- API Specification 16C, Specification for Choke and Kill Systems
- API Specification 17K, Specification for Bonded Flexible Pipe
- API Technical Report 10TR1, Cement Sheath Evaluation
- API Technical Report 10TR4, Technical Report on Considerations Regarding Selection of Centralizers for Primary Cementing Operations

- API Recommended Practice 49, Recommended Practice for Drilling and Well Servicing Operations Involving Hydrogen Sulfide
- API Standard 53, Blowout Prevention Equipment Systems for Drilling Wells
- API Recommended Practice 65-2, Isolating Potential Flow Zones During Well Construction
- API Recommended Practice 90, Annular Casing Pressure Management for Offshore Wells

Fire and Explosion Prevention and Control, National Fire Protection Association (NFPA) Standards

- NFPA 30 – Flammable and Combustible Liquids Code and Handbook
- NFPA 11 – Foam Extinguishing Systems
- NFPA 12 – A&B Halogenated Extinguishing Agent Systems
- NFPA 15 – Water Spray Fixed Systems
- NFPA 20 – Centrifugal Fire Pumps
- NFPA 70 – National Electrical Code

3.4.3 Regional Setting

Figure 1-2 shows the portions of the CCFO Planning Area indicating major oil and gas resource formations. The formations and sedimentary basins include Sacramento, San Joaquin, and Salinas Basins. Hazardous materials may be present at current oil and gas fields or well sites that would have further development or exploration, as discussed in the Reasonably Foreseeable Development Scenario (Appendix B). These materials may include existing soil contamination from spills and leaks that occurred previously and chemicals stored at drilling pads or staging areas.

Other hazards could include military munitions and explosives at the former Fort Ord military base and Fort Hunter Liggett. In accordance with the new management actions with this RMPA (ENERG-A1 in Chapter 2), Fort Ord National Monument is excluded from future mineral leasing. Other sources of hazardous materials within the CCFO Planning Area include naturally occurring materials, such as asbestos found in serpentine soils and mercury, chromium, and other heavy metals found in soils surrounding past mining operations (BLM, 2013). These materials also can be found at a distance from past mining operations because some of these naturally occurring hazardous materials have been eroded and transported via stormwater runoff to downstream depositional areas (BLM, 2013).

The California Division of Mines and Geology conducted an investigation in the mid-1950s that identified chrysotile asbestos as a major component of the New Idria Formation (BLM, 2013). Asbestos is a known carcinogen and exposure to airborne asbestos can lead to adverse health effects, including asbestosis and lung cancer. The identification of naturally occurring asbestos, as well as knowledge of potential adverse health effects from exposure to this naturally occurring hazardous material, led to the designation of the Clear Creek Serpentine Area of Critical Environmental Concern (ACEC) in 1984 (BLM, 2013). Recreational use of the Clear Creek Serpentine ACEC remains restricted to minimize human exposure to asbestos and has been closed to oil and gas leasing

In addition to the regional hazards described above, the CCFO Planning Area contains areas that are favorable to the growth of the "Valley Fever" vector, which is the fungus *Coccidioides immitis* (COSB, 2015). This fungus tends to grow in areas with hot, dry summers and moderate winters. The fungus can be mobilized during soil disturbing activities that can result in airborne fungal spores which can infect construction personnel, visitors of public lands, and wildlife. Most cases of the disease are mild, with flu-like symptoms that rarely require medical attention; however, extreme cases of the disease can be fatal (COSB, 2015). For additional discussion of Valley Fever, please see Section 3.9 (Soil Resources).

Oil and Gas Facilities

Most of California's historic oil and gas production has been from conventional resources, or vertical wells, into traditional oil and natural gas reservoirs. Today, after recovery of some of the reservoirs' hydrocarbons, most of California's oil and gas reservoirs require some form of artificial lift, such as a pumping unit, to flow (DOC, 2015). Despite being a top producer of oil and gas resources and a major contributor to the nation's economy (responsible for approximately one-tenth of the United States' total production), production levels in California have shown a declining trend over the past 25 years.

The areas of the fields within the CCFO Planning Area are no exception; however, some operators have slowed or flattened the decline rate by applying enhanced oil recovery (EOR) technology (e.g., steam injection into heavy oil deposits). Information regarding the number of active wells and production in the primary fields in the CCFO Planning Area is summarized in Table 3.4-1 for 2014.

Table 3.4-1. Central Coast Field Office Area Oil and Gas Production (2014)

Basin	Field	Operator	Active Wells	Oil (Mbbl)	Gas (MMcf)
San Joaquin	Coalinga	Aera Energy	1,995	2,590.3	225
		Cal Energy	9	24.6	0
		Chevron USA	N/A	210.6	0
		Seneca	169	266.9	0
	Jacalitos	Crimson Resource Management	92	7.6	6.5
		HT Olsen O&G	19	5.8	0
Salinas	Lynch Canyon	Eagle Pet.	43	24.6	0
	San Ardo	Aera Energy	979	3,589.0	507
		NY Oil	43	25.3	0
		Vintage Prod.	19	75	3.5

Source: DOGGR, 2014

Characteristics of Crude Oil

This section discusses the properties of crude oil as it relates to safety risks, such as oil spills, toxic exposure, and fires.

All crude oils contain carbon, hydrogen, sulfur, nitrogen, oxygen, minerals and salts in varying proportions depending on their source. A crude oil spill could damage the environment if oil spilled on land, or in rivers, creeks, or the ocean, and could produce public safety concerns from fires that may arise if the oil burns. Flammable vapors (propane, butane, and pentane) may also emanate from the crude oil, and there may be safety hazards arising from toxic vapors in the crude oil (primarily benzene and hydrogen sulfide).

As crude oil emerges from the wellhead, is a heterogeneous mixture of solids, liquids and gases. This mixture includes sediments, water, salts, and acid gases, including hydrogen sulfide and carbon dioxide. The major hydrocarbon constituents include:

- **Alkanes (paraffins)** – straight-chain normal alkanes and branched iso-alkanes with the general formula CnH2n+2, where C stands for carbon and H stands for hydrogen. The major paraffinic components of most crude oils are in the C1 (=methane) to C35 range. The alkane composition in crude oils typically varies from 15 to 60 percent.
- **Cycloalkanes (naphthenes)** – saturated hydrocarbons containing structures with carbon atoms linked in a ring. The cycloalkane composition in crude oils worldwide typically varies from 30 to 60 percent.

- **Aromatic Hydrocarbons** – most commonly benzene, benzene derivatives, and fused benzene ring compounds. The aromatic composition in crude oils typically varies from 3 to 30 percent. The concentration of benzene in crude oils ranges between 0.01 percent and 1 percent.

The quality of crude oil is determined by a number of characteristics that affect the proportions of transportation fuels and petroleum products produced when the oil is refined. The two most common measurements of crude oil quality are the specific gravity and the sulfur content of the oil.

The specific gravity is typically measured using the American Petroleum Institute (API) standard or the API gravity of the crude oil (which is measured in degrees). The API gravity is the measure of the weight of crude oil in relation to the weight of water (water has an API gravity of 10 degrees).

Sulfur occurs in many natural compounds and as hydrogen sulfide (H_2S) in the crude oil. Total sulfur ranges from approximately 0.1 to 5 percent or higher by weight in crude oils, and hydrogen sulfide concentrations can reach 100 parts per million (ppm) in "sour" crudes. Crude oil is defined as "sweet" if the sulfur content is 0.5 percent or less by weight and "sour" if the sulfur content is greater than 1.0 percent. Other constituents of crude oil include nitrogen and oxygen compounds, water, and metal-containing compounds such as vanadium and nickel. Table 3.4.2-2 depicts crude oil properties.

Table 3.4-2. Crude Oil Properties

API Gravity (°)	
Light Crude	38–45
Medium Crude	28–38
Heavy Crude	12–28
Sulfur Content (percent by weight)[1]	
Sour Crude	0.8–5
Semi-Sweet Crude	0.5–0.8
Sweet Crude	0.1–0.5

1 - Total sulfur content; not equivalent to hydrogen sulfide (H_2S).
Source: http://www.petroleum.co.uk/composition, California Energy Commission.

Information pertaining to the crude characteristics from the most active fields in in the CCFO Planning Area is presented in Table 3.4-3.

Table 3.4-3. Crude Oil Characteristics of Active Fields in the CCFO Planning Area

Field	API Gravity (degrees API)	Depth, Average/Range	Sulfur Content (percent by weight)	Light Hydrocarbons (percent by weight)	County
Coalinga West Side	11-18	2000: 450/3500	0.75	N/A	Fresno
Coalinga East Extension	12-30	700-4600	0.64	N/A	Fresno
Jacalitos	31-39	3400	0.34	N/A	Fresno
San Ardo	13-14	2400: 2100/3025	2.3	2.1	Monterey
Lynch Canyon	N/A	N/A	N/A	N/A	Monterey

Source: DOGGR 1998, DOGGR 2014 and CEC 2006

The designation of "light" or "heavy" for crude oils is based on their density (API gravity is the common measure of crude oil density). Coalinga West Side and East Extension crude typically has an API gravity range of 11-30° and a sulfur content of approximately 0.75 percent and is thus characterized as heavy, semi-sweet crudes. San Ardo crude is also heavy but sour since it contains more sulfur. Jacalitos production would be considered a medium sweet crude.

Given heavy crude oil has lower levels of light end components (lower carbon number hydrocarbon constituents), it is less volatile and has little to no associate gas (C_1 to C_4) and hydrogen sulfide. For these crudes, the sulfur constituents are primarily in the form of mercaptans and thiophenes.

Produced Gas

Produced gas presents hazards in the form of toxicity, due to the presence of H_2S gas; flammability in the form of vapor cloud fires and explosions; and thermal radiation due to flame jet fires emanating from a gas pipeline leak or rupture.

Hydrogen sulfide is a toxic gas often present in the fluids extracted from wells. In the gas phase, it produces odors easily detected in ambient air at concentrations below 0.1 ppm, and it can produce injuries at levels equal to 30 ppm (ERPG [Emergency Response Planning Guidelines]-2) and fatalities as low as 100 ppm (ERPG-3) if exposed to for long enough periods (e.g., over 60 minutes). It has a characteristic "rotten egg" smell. A complicating factor that increases its hazards is that it also produces olfactory paralysis (loss of ability to smell) at levels as low as 50 ppm, or below those at which it could produce injuries or fatalities.

Table 3.4-1 above presents annual oil and gas production totals for the current operators in the four primary fields. Of the four operators in Coalinga, only one reported any gas production in 2014. For San Ardo, two of the three operators reported gas production. The production of gas is dependent on the location of the wells in the formation, and varies depending on the stimulation technique and age of the producing area. Areas of heavy crude production typically lack substantial associated gas production, and this is the case in the CCFO Planning Area, where limited gas production avoids the potential hazards of handling, processing, and transporting produced gas.

Well Stimulation Techniques and Enhanced Oil Recovery

Well stimulation treatments and EOR occur in the Planning Area, and while well stimulation technologies may be used, production using EOR is much more common in the Planning Area. Production through the use of EOR encompasses various techniques for increasing the amount of crude oil that can be extracted from an oil field over the life of a well. It is sometimes referred as tertiary recovery. The RFD Scenario in Appendix B of this EIS provides background information on the different types of EOR techniques and their application to California oil and gas development.

Water flooding, which is the most widely used secondary recovery method in the U.S., is also discussed in Appendix B, since it is used within the CCFO Planning Area. Water flooding includes injection of water into the reservoir, usually to increase pressure and thereby stimulate production, and also to sweep oil through the reservoir towards producing wells. Fields that have reported levels of gas production in Table 3.4-1 are likely to use water flood as a means of maintaining reservoir pressure.

Flowback (if a well is stimulated) and produced water are often injected into Class II wells for EOR. Based on data provided by DOGGR, there were approximately 35,000 active Class II[1] wells in California in 2013. Approximately 5 percent of these wells were used for water and gas disposal, while the remaining were used for EOR (i.e., cyclic steam, steam flood, and water flood) (DOC, 2015).

Also mentioned in Appendix B, the most recent available data indicates a total of 76 percent of production in 2009 was due to application of steam injection and water flood and techniques. About 85 percent of the production from the Coalinga Field is from thermal recovery projects according to DOGGR. EOR techniques are utilized in all of the most productive oil and gas fields within the CCFO Planning Area, which are listed as follows:

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[1] Injection wells are classified by the U.S. Environmental Protection Agency into six classes according to the type of fluid they inject and where the fluid is injected. Class II wells inject fluids associated with oil and natural gas production operations. Most of the injected fluid is brine that is produced when oil and gas are extracted from the earth.

- Coalinga oil and gas field with Coalinga East Extension oil and gas field (steam flood, cyclic steam, and water flood);
- San Ardo oil and gas field (steam flood, cyclic steam, water flood, and air injection);
- Lynch Canyon oil and gas field (cyclic steam);
- Jacalitos oil and gas field (cyclic steam and water flood);
- Kettleman North Dome oil and gas field (water flood); and

In California, oil and gas well stimulation treatments may be used during well completion or within weeks or months after a well is put into production in order to keep it economically viable. Hydraulic fracturing, which is one type of well stimulation treatment, is the injection of water, a proppant (usually sand or ceramic beads) and carrier fluids (typically proprietary chemicals designed to enhance recovery yields) into a wellbore over one or two days at pressures sufficient to fracture the reservoir rocks. This increases the flow of hydrocarbons into the wellbore up to several hundred feet from the well. In California, it is typically applied in sandstone, diatomite, limestone, or dolomite formations, and is conducted below the pressure at which the cap rock would fracture.

Service companies have developed a number of different oil and water-based fluids and treatments to more efficiently induce and maintain permeable and productive fractures during the hydraulic fracturing process. The composition of these fluids varies widely, from simple water and sand to complex polymeric substances with a multitude of additives. During the acid treatment step, hydrochloric acid (HCl), is one of the additives used and it cleans out wellbore and perforation holes and helps dissolve carbonate minerals and extra cement. The hydrochloric acid used is diluted with water to a 15 percent acid solution and the typical volumes of acid solutions pumped according to the EPA are 0.08 to 2.1 percent of total fluid pumped. Taking into account the lower concentration of HCl, and that the acid treatment step is not generally used in California, the potential risk to the public regarding hydrochloric acid is negligible.

3.4.4 Current Conditions and Trends

As discussed in Section 3.4.3, current active wells on BLM-administered land are in the San Joaquin Basin near the eastern side of the BLM administrative area. While there currently are no BLM active wells in the Salinas Basin, there are current authorized oil and gas leases on Federal mineral estate near the San Ardo Field, which is one of the large petroleum fields in California. Given the current activity on BLM lands near Coalinga, and the commercial interest in leases near San Ardo, current trends are focused on these plays. As discussed in the RFD Scenario in Appendix B, current development on BLM land in the Sacramento Basin is limited. Additionally, it has been classified by the CCST as an area of moderate conventional resource potential and low unconventional resource potential.

Central Coast Field Office Planning Area

Current BLM active wells are in the San Joaquin Basin, and these include the Coalinga East, Jacalitos, and Kettleman North Dome plays. The major plays in the Salinas Basin high potential area are San Ardo and Lynch Canyon.

Current and ongoing oil and gas development are almost exclusively occurring within the areas of high resource occurrence potential that are highlighted on Figure 5-1, within the San Joaquin and Salinas Basins. Maps in Appendix B show the locations of plays and active oil and gas wells within the CCFO Planning Area.

Leases Subject to Settlement Agreement

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in a historically nonproductive wildcat area west of San Ardo field (DOGGR, 2007) and in or near the Vallecitos oil field, which is an area of limited production.

3.5 Air Quality and Atmospheric Conditions

3.5.1 Introduction

Ground-level ozone and particulate matter are the major air quality concerns in the air basins within which the Central Coast Field Office (CCFO) is located. Generally, but with some exceptions, the air pollutant concentrations of ozone and particulate matter recorded by monitoring stations in these air basins do not meet Federal or State of California ozone air quality standards. Ozone is not a directly emitted pollutant; it forms in the presence of sunlight from oxides of nitrogen (NOx) and volatile organic compounds (VOC), including reactive organic gases (ROG). Ambient air concentrations of particulate matter, measured as respirable particulate matter (PM10) and fine particulate matter (PM2.5), also are found above Federal and State standards at many monitoring sites within the CCFO Planning Area. Particulate matter is directly emitted to the atmosphere by vehicle travel on paved and unpaved roads and surfaces, from combustion of fuels, waste burning, and agricultural practices; PM2.5 is also indirectly formed in the atmosphere by the reaction of precursor gases that include sulfur oxides (SOx) and NOx, especially tailpipe emissions from off-road equipment and motor vehicles.

3.5.2 Regulatory Framework

Federal and State legislation and subsequent regulations to protect ambient air quality include:

- The Federal Clean Air Act (CAA) of 1970, 42 United States Code (USC) 7401 et seq., as amended in 1977 and 1990, including the New Source Review (NSR) facility permitting programs applicable to construction or modification of specified stationary sources, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants promulgated under the authority of the Federal CAA.
- Code of Federal Regulations (CFR) Title 40, Parts 50-99.
- California Clean Air Act of 1988, including amendments.
- California Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly).
- Local air district rules and regulations promulgated under the Federal CAA or other authorities.

Ambient Air Quality Standards

Ambient air quality standards have been established by both Federal and State legislation for a variety of air pollutants, known as criteria air pollutants. National "primary" standards represent thresholds above which may result in known impacts on human health. National "secondary" air quality standards define levels of air quality judged necessary to protect the public welfare from any known effects of an air pollutant, or to protect other resources, such as crops, vegetation, soil or water. The State of California has also established a set of ambient air quality standards to provide additional protection.

Attainment Status and Criteria Air Pollutants

The U.S. EPA, California Air Resources Board (ARB), and local air districts work together to classify each area as attainment, unclassified, or nonattainment depending on the historical levels of contaminants measured in the ambient air and the history of pollutants occurring at levels that do not attain the standards. Table 3.5-1, Table 3.5-2, and Table 3.5-3 summarize the attainment designations for both the Federal and State standards for the criteria pollutants in the North Central Coast, San Joaquin Valley, and San Francisco Bay Area air basins, respectively.

Table 3.5-1. Attainment Status for North Central Coast Air Basin

Pollutant	Federal Designation	California Designation
Ozone	Attainment	Nonattainment
PM10	Attainment	Nonattainment
PM2.5	Attainment	Attainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Source: ARB, 2013; EPA, 2015.

Table 3.5-2. Attainment Status for San Joaquin Valley Air Basin

Pollutant	Federal Designation	California Designation
Ozone	Nonattainment (Extreme)	Nonattainment
PM10	Attainment (Maintenance)	Nonattainment
PM2.5	Nonattainment	Nonattainment
CO	Attainment (Maintenance)[1]	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

1 - Metropolitan Stockton, Modesto, Fresno, and Bakersfield only.
Source: ARB, 2013; EPA, 2015.

Table 3.5-3. Attainment Status for San Francisco Bay Area Air Basin

Pollutant	Federal Designation	California Designation
Ozone	Nonattainment (Marginal)	Nonattainment
PM10	Attainment	Nonattainment
PM2.5	Nonattainment	Nonattainment
CO	Attainment (Maintenance)[1]	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

1 - Metropolitan areas only.
Source: ARB, 2013; EPA, 2015.

Local air districts are responsible for developing an air quality management plan (AQMP) or clean air plan (CAP) where necessary to attain the CAAQS, while the ARB develops and implements statewide air pollution control plans to achieve and maintain the NAAQS, known as the State Implementation Plan (SIP). Each local air district: develops the clean air strategies and air quality plans, such as an AQMP or CAP, for the attainment of ambient air quality standards; adopts and enforces rules and regulations concerning sources of air pollution; and issues permits for stationary sources of air pollution. Each air quality plan relies upon an emissions inventory and emissions control measures to demonstrate how the area will attain and maintain the ambient air quality standards.

Ozone (O_3). Ozone is a colorless, toxic gas. Ozone is one of a number of substances called photochemical oxidants, formed in the atmosphere as a result of the action of ultraviolet sunlight on certain chemicals in the atmosphere. Chemicals that react to form ozone are referred to as precursor emissions, primarily NOx and VOC. NOx is a primary culprit in the formation of both ozone and PM2.5. Ozone forms

downwind from the source during the daylight hours. The reaction is accelerated by increased sunlight intensity and temperature. As a result, peak ozone levels are generally reached in the late afternoon during the warmer times of the year. Adverse health effects of ozone include: aggravation of respiratory and cardiovascular diseases; reduced lung function; and increased cough and chest discomfort. Motor vehicle emissions, industrial emissions, and high ambient temperatures that occur in the warmer inland portions of the Planning Area contribute to summertime ozone formation and subsequent violations of the standards. In the coastal areas, ozone concentrations exceed the standards less frequently.

Particulate Matter (PM). Particulate matter is comprised of finely divided soils or condensable liquids including dust, fly ash, soot, smoke, aerosols, fumes, mists, and vapors that can be suspended in the air for extended periods of time. Particles originate from a variety of stationary and mobile sources and may be directly emitted (primary emissions) or formed in the atmosphere secondarily. Anthropogenic PM sources include industrial processes, agricultural operations, combustion of wood and fossil fuels, construction and demolition activities, and airborne entrainment of road dust. Natural sources that contribute to the PM problem include windblown dust and wildfires. Inhalation of PM may also result in exposure to the hazards of naturally occurring asbestos, which can be found in serpentine soils within the CCFO Planning Area (Section 3.4, Hazardous Materials and Public Safety). Secondary PM is formed in the atmosphere from precursor pollutants such as SOx, NOx, VOCs, and ammonia. Control strategies to reduce PM precursor emissions generally have a beneficial impact on reducing ambient PM levels.

Respirable Particulate Matter (PM10). PM10 emissions are comprised of particulate material equal to or less than 10 microns and is a mixture of substances including elemental carbon, lead and nickel; compounds such as nitrates, organics and sulfates. PM10 also originates from the complex mixtures of diesel exhaust and soil. Particulate emissions are considered direct when particles are emitted directly from the source. PM10 precursor emissions are emitted as gases that form into particles in the atmosphere downwind from the source. Human activities that contribute to the PM10 emissions include combustion sources such as stack emissions, diesel exhaust, and smoke from prescribed fire and wild fire, fugitive dust sources such as construction and demolition activities, off highway vehicle (OHV) travel and open areas, unpaved public roads and parking lots, industrial activities, and military activities. One of the reasons for concern with PM10 emissions is their adverse effect on human health; PM10 is considered respirable because particles of this size can be easily inhaled into the nose, throat and/or lungs.

Health hazards in the CCFO Planning Area include inhaling airborne dust that may contain the microscopic fungus that causes Valley Fever. The fungus grows in the soil and gets into the air when the ground is broken and soil or dust becomes airborne. Hazards posed by fugitive dust emissions containing Valley Fever are discussed in more detail in Section 3.4, Hazardous Materials and Public Safety.

Fine Particulate Matter (PM2.5). Fine particles equal to or less than 2.5 microns pose a greater threat to human health than PM10 because they can deposit in lungs. PM2.5 consists of chemical compounds that mostly result from fuel combustion processes, although fugitive dust sources are also important contributors. PM2.5 is emitted directly from sources and forms secondarily through the chemical transformation of precursor emissions in the atmosphere. Primary precursor emissions are from the sulfur and nitrogen components of fuel combustion. Secondary PM2.5 accounts much of the ambient PM2.5 especially in inland areas where ammonia is abundant to facilitate conversion of the precursors into airborne particles. Control strategies and programs for reducing PM2.5 target diesel engines, including heavy-duty trucks and off-road equipment, because diesel particulate matter is a toxic air contaminant regulated by the State.

Carbon Monoxide (CO). CO can cause significant effects on human health because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death. The major sources of carbon monoxide are combustion processes, such as fuel combustion in motor vehicles and industrial processes, agricultural burning, prescribed burning, and wildfires. Motor vehicles and other internal combustion engines are the dominant source of CO emissions in most areas. CO is also created during refuse, agricultural, and wood stove burning,

and by some industrial processes. High CO levels develop primarily during winter when periods of light winds combine with ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. CO levels have dramatically declined since the early 1990s when stringent motor vehicle exhaust and clean fuels programs came into effect.

Sulfur Oxides and Hydrogen Sulfide. Sulfur is a component of petroleum and natural gas that may be removed during treatment and refining processes. When sulfur is present in a fuel the products of combustion include sulfur dioxide (SO_2) and other sulfur oxides (SOx). Sulfur oxides in the atmosphere are precursors to acid rain and PM2.5 formation through the airborne reactions of sulfates into sulfuric acid gas (H_2SO_4) and ammonium sulfate. Hydrogen sulfide (H_2S) is also a component of natural gas as well as a byproduct of oil and gas treatment and refining. SOx and H_2S cause breathing difficulties, and H_2S has a distinctive rotten-egg odor easily detected in ambient air at very low concentrations below 0.1 ppm (ARB, 2009).

Federal Class I Areas

More stringent standards have been established for maintaining air quality and preserving visibility in many designated wilderness areas. Pinnacles National Park and Ventana Wilderness (managed by U.S. Forest Service and including some BLM public lands) have been designated as Federal Class I Areas and granted special air quality protections under Section 162(a) of the Federal Clean Air Act. If BLM lands are added to a wilderness area after the wilderness area was designated as a Federal Class I Area under the CAA, the BLM parcels in the expanded wilderness also become Federal Class I Areas. For Federal Class I Areas, the CAA requires special management to control emissions from major stationary sources within 100 kilometers of the area. Subjected sources must comply with the Prevention of Significant Deterioration (PSD) program to prevent violations of the ambient air quality standards and protect the natural qualities of and visibility in Federal Class I Areas.

All of the existing and active oil and gas fields within the Monterey County, San Benito County, and Fresno County portions of the CCFO Planning Area are within 100 kilometers of the Pinnacles National Park Class I Area, except for marginal portions of those fields along the boundary of Fresno and Kings Counties.

Federal General Conformity Rule

The classification of any area as a Federal nonattainment or maintenance area introduces applicability of the Federal General Conformity rule for Federal agencies. Section 176(c) of the Federal CAA and regulations (40 CFR 93, Subpart B) state that "no department, agency or instrumentality of the Federal government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan." The intent of the General Conformity rule is to prevent the air quality impacts of Federal actions from causing or contributing to a violation of the NAAQS or interfering with the purpose of the SIP. This means that Federal agencies must make a determination that proposed actions in Federal nonattainment areas conform to the applicable EPA approved implementation plans (if pertinent) before the action is taken.

The regulations provide a phased process for meeting the General Conformity requirements of the CAA that begins with an applicability analysis before triggering a requirement for a conformity determination and subsequent review. Because Federal actions often do not result in a significant increase in emissions, the General Conformity regulations include a number of exemptions, including for actions that fall below *de minimis* emission levels based on the pollutant and nonattainment severity. As defined by 40 CFR 93.153, *de minimis* levels are the thresholds above which a conformity determination must be performed. Actions in areas that attain the national ambient air quality standards, for example in the North Central Coast air basin, are exempt from determining conformity with SIPs. Criteria pollutant *de minimis* rates that apply in the nonattainment and maintenance areas within the CCFO Planning Area are indicated in Table 3.5-4.

Table 3.5-4. General Conformity Applicability (*de minimis*) Levels

	San Joaquin Valley Air Basin		San Francisco Bay Area Air Basin	
Pollutant	Federal Designation	General Conformity *de minimis* Level (tons per year)	Federal Designation	General Conformity *de minimis* Level (tons per year)
Ozone (VOC or NOx)	Nonattainment (Extreme)	10	Nonattainment (Marginal)	100
PM10	Attainment (Maintenance)	100	Attainment	—
PM2.5	Nonattainment	100	Nonattainment	100
CO	Attainment (Maintenance)[1]	100	Attainment (Maintenance)[1]	100
NO_2	Attainment	100 (PM2.5 precursor)	Attainment	100 (PM2.5 precursor)
SO_2	Attainment	100 (PM2.5 precursor)	Attainment	100 (PM2.5 precursor)

1 - Metropolitan areas only.
Source: EPA, 2015.

Hazardous Air Pollutants

Federal standards also exist for categories of sources that emit hazardous air pollutants (HAPs) as defined in Section 112(b) of the Federal CAA (42 USC Section 7412(b)), including HAPs from oil and gas production. In accordance with Title III of the Federal CAA as amended in 1990, the National Emission Standards for Hazardous Air Pollutants set limits on emissions from sources in the defined categories (e.g., Oil and Natural Gas Production, 40 CFR 63, Subpart HH).

In addition to ambient air quality standards, the State of California has a long-term program to identify, assess, and control ambient levels of toxic air contaminants (TACs). This program was initiated by passage of the Air Toxics "Hot Spots" Information and Assessment Act of 1987. As the name implies, "hot spots" are localized point-source emissions of air toxics generated by both large and small industrial operations such as mining, oil and gas, manufacturing, and processing. Air Toxic "hot spot" violations are monitored and regulated by the local air districts.

The California Health and Safety Code defines a TAC as an air pollutant which may cause or contribute to an increase in mortality or serious illness, or which may pose a present or potential hazard to human health. There are almost 200 compounds designated in California regulations as TACs (17 CCR Sections 93000-93001). The list of TACs also includes the substances defined in Federal statute as HAPs. Although dangerous, hydrogen sulfide (H_2S) is not a TAC or HAP.

Local Air District Rules and Regulations

Lands managed by BLM CCFO are within the jurisdiction of three local air districts:

- Monterey Bay Unified Air Pollution Control District (MBUAPCD) has jurisdiction within Santa Cruz, San Benito and Monterey Counties.
- San Joaquin Valley Air Pollution Control District (SJVAPCD) has jurisdiction within San Joaquin, Stanislaus, Fresno, and Merced Counties.
- San Francisco Bay Area Air Quality Management District (BAAQMD) has jurisdiction within Alameda, Contra Costa, San Mateo, and Santa Clara Counties.

Monterey Bay Unified APCD Rules and Regulations

Prohibitions in MBUAPCD Regulation IV make all existing activities subject to limitations on visible emissions (MBUAPCD Rule 400) and prohibitions from causing dust or other emissions at a level that constitutes a nuisance (MBUAPCD Rule 402). Requirements for air permits appear in MBUAPCD Regulation II (Permits).

Additional potentially applicable rules include:

- MBUAPCD Rule 404. Sulfur Compounds and Nitrogen Oxides (including boilers, furnaces, or similar fuel burning equipment and H_2S from crude oil production casing gas collection treatment and destruction systems).
- MBUAPCD Rule 412. Sulfur Content of Fuels.
- MBUAPCD Rule 413. Removal of Sulfur Compounds.
- MBUAPCD Rule 417. Storage of Organic Liquids.
- MBUAPCD Rule 420. Effluent Oil Water Separators.
- MBUAPCD Rule 427. Steam Drive Crude Oil Production Wells.
- MBUAPCD Rule 1000. Permit Guidelines and Requirements for Sources Emitting Toxic Air Contaminants.
- MBUAPCD Rule 1003. Air Toxics Emissions Inventory and Risk Assessments.

San Joaquin Valley APCD Rules and Regulations

Prohibitions in SJVAPCD Regulation IV make all existing activities subject to limitations on visible emissions (SJVAPCD Rule 4101) and prohibitions from causing dust or other emissions at a level that constitutes a nuisance (SJVAPCD Rule 4102). Requirements for air permits appear in SJVAPCD Regulation II (Permits).

Additional potentially applicable rules include:

- SJVAPCD Rule 2280. Portable Equipment Registration.
- SJVAPCD Rule 4301. Fuel Burning Equipment.
- SJVAPCD Rule 4306. Reduction of NOx from Boilers, Steam Generators, and Heaters.
- SJVAPCD Rule 4311. Flares.
- SJVAPCD Rule 4320. Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters greater than 5.0 MMBtu/hr.
- SJVAPCD Rule 4401. Steam-Enhanced Crude Oil Production Wells.
- SJVAPCD Rule 4402. Crude Oil Production Sumps
- SJVAPCD Rule 4407. In-Situ Combustion Well Vents.
- SJVAPCD Rule 4408. Glycol Dehydration Systems.
- SJVAPCD Rule 4409. Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities Pump and Compressor Seals at Petroleum Refineries and Chemical Plants.
- SJVAPCD Rule 4455. Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants.
- SJVAPCD Rule 4623. Storage of Organic Liquids.
- SJVAPCD Rule 4624. Transfer of Organic Liquids.
- SJVAPCD Rule 4702. Internal Combustion Engines.
- SJVAPCD Rule 4703. Stationary Gas Turbines.
- SJVAPCD Regulation VIII. Fugitive PM10 Prohibitions and Fugitive Dust Rules (Rule 8011, 8021, 8031, 8061, and 8071, etc.).

San Francisco Bay Area AQMD Rules and Regulations

Prohibitions in BAAQMD Regulation 6, Rule 1 make all existing activities subject to limitations on visible emissions (BAAQMD Rule 6-1-305) and prohibitions from causing dust or other emissions at a level that constitutes an annoyance. Requirements for air permits appear in BAAQMD Regulation 2 (Permits) and for controlling organic compounds during liquids handling and storage are in BAAQMD Regulation 8 (Organic Compounds).

3.5.3 Regional Setting

The respective air districts managing air quality in the CCFO Planning Area have developed air quality plans that govern development and air pollution-producing activities within each air district. These plans consider the cumulative effects of all air pollution sources on the overall air pollution levels within each district. The ultimate goal of these plans is to maintain compliance with an air quality standard or to achieve compliance with an air quality standard if the air district is not in compliance.

3.5.4 Current Conditions and Trends

Meteorological Conditions

In general, the summer climate of California's coastal areas is controlled by high pressure centered over the northeastern Pacific Ocean. The summer period is rarely stormy due to the high-pressure center. During this period, precipitation is negligible and winds are generally from the northwest. Air from the northwest, passing over cold, upwelling water off the coast, frequently forms low clouds and/or fog along the coast. This generally tranquil weather period also is characterized by the presence of atmospheric temperature inversions which tend to inhibit the dispersion of air pollutants and allow for high air pollution potential.

During winter, the high pressure over the northeastern Pacific Ocean generally weakens and moves southward, allowing storms to occur more frequently. The summertime atmospheric temperature inversions and cold, upwelling water off the coast disappear during the winter, and wind speeds tend to be higher; these factors generally result in low air pollution potential. However, during winter, on occasions when the Pacific high-pressure area strengthens, strong atmospheric temperature inversions can develop near the land surface and winds weaken, resulting in high air pollution potential.

Several subclimates occur within the CCFO Planning Area. These are areas where local topography plays a significant role in modifying regional weather conditions. In the San Francisco Bay and North Central Coast regions, temperatures along the coast are milder especially in the summer, and there is less variation in day/night or seasonal temperatures than at inland locations. The San Joaquin Valley has generally cool, wet winters and hot, dry summers, and the air pollution potential is high because movement is constrained by the surrounding topography. Conditions within the North Central Coast vary due to the mountainous topography that protects inland areas including the Salinas Valley and traps air pollution; however, coastal areas have mild temperatures throughout the year and a lower air pollution potential. See also Section 3.6.4 for Current Conditions and Trends as related to climate change.

Central Coast Field Office Planning Area

The CCFO Planning Area includes portions of three air basins. San Joaquin, Stanislaus, Fresno, and Merced Counties are in the San Joaquin Valley Air Basin. San Benito and Monterey Counties are in the North Central Coast Air Basin, which also includes Santa Cruz County. Additional Federal lands in Alameda, Contra Costa, San Mateo, and Santa Clara Counties are within the San Francisco Bay Area Air Basin.

North Central Coast Air Basin

Air quality in the North Central Coast Air Basin is managed by the MBUAPCD. Seven air quality monitoring stations (Hollister, Salinas, Scotts Valley, Santa Cruz, Davenport, Carmel Valley, and Watsonville) in the basin collect data for determining compliance with Federal and State air quality standards. Air quality also is monitored by the National Park Service at Pinnacles National Park. Emissions of air pollutants in the North Central Coast Air Basin are much lower than those for the heavily populated San Francisco Bay Area or San Joaquin Valley air basins. The history of oil and gas exploration and development on Federal lands within the North Central Coast air basin is divided between Monterey County and San Benito County.

San Joaquin Valley Air Basin

Air quality in the San Joaquin Valley Air Basin is managed by the SJVAPCD. The San Joaquin valley is a relatively flat area at an elevation at or below 400 feet above sea level. Twenty-nine ambient air quality monitors are located throughout the air basin. Emissions in this air basin originate primarily from the urban lands and agricultural operations spread along a roughly north-south axis in the valley and from the oil and gas industry in the southern portion of the valley.

Emissions of all major criteria air pollutants have been trending downward since 2000; although during this same period, emissions of SOx, PM10 and PM2.5 remained relatively steady. Controls on motor vehicle emissions are primarily responsible for these decreases, even though population and motor vehicle miles traveled in the air basin have increased substantially. Emissions of VOC also have decreased due to the implementation of stationary source controls on petroleum facilities in the air basin. The history of oil and gas exploration and development on Federal lands within the CCFO Planning Area portion of the San Joaquin Valley air basin is focused to Fresno County.

San Francisco Bay Area Air Basin

Air quality within the San Francisco Bay Area Air Basin is managed by the BAAQMD. Although the San Francisco Bay Area Air Basin is highly urbanized, criteria air pollutant concentrations are much lower in this air basin than in the San Joaquin Valley Air Basin, partly due to emissions reductions and partly due to more favorable weather conditions for transporting pollutants out of the air basin. The history of activity for oil and gas exploration and development on Federal lands within the CCFO Planning Area portion of the San Francisco Bay Area air basin is limited.

Leases Subject to Settlement Agreement

Leases subject to the settlement agreement occur in the North Central Coast air basin and in the jurisdiction of the MBUAPCD. There are no leases subject to the settlement agreement located in the San Joaquin Valley air basin or the San Francisco Bay Area air basin.

The leases subject to the settlement agreement that occur in southern Monterey County are approximately 20 to 50 kilometers to the southeast away from the Ventana Wilderness Class I Area and over 40 kilometers south of Pinnacles National Park. The leases subject to the settlement agreement that occur in San Benito County are approximately 22 to 46 kilometers to the east of Pinnacles National Park and over 50 kilometers northeast of Ventana Wilderness.

3.6 Climate Change/Greenhouse Gas Emissions

3.6.1 Introduction

The global climate depends on the presence of greenhouse gases (GHG) to naturally provide the "greenhouse effect." The greenhouse effect is driven mainly by water vapor, aerosols, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other GHGs that trap heat radiated from the Earth's surface. Globally, the presence of GHGs affects temperatures, precipitation, storm activity, sea levels, ocean currents, and wind patterns. Concentrations of CO_2 in the atmosphere have increased by more than 40 percent since the Industrial Revolution. That the planet has warmed is "unequivocal," and is corroborated though multiple lines of evidence, as is the conclusion that the causes are very likely human in origin (U.S. GCRP, 2014). Human activity contributes to emissions of six primary GHGs: CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The standard definition of anthropogenic GHG includes these six substances under the 1997 Kyoto Protocol (UNFCCC, 1998).

The most important and widely occurring GHG pollutant is CO_2, primarily derived from the use of fossil fuel as a source of energy. Fertilizer use, agriculture, and land use change are also major sources of CH_4 and N_2O. Global emissions of CO_2 from fossil fuel combustion and cement production in 2011 were equivalent to 8.3 billion metric tons of carbon or 54 percent above the 1990 level (IPCC, 2013). The principal component of natural gas is CH_4, and it is also produced biologically under anaerobic conditions in ruminant animals, landfills, and waste handling. Along with CO_2, CH_4 is the second most important anthropogenic GHG in the atmosphere.

Each GHG has a global warming potential (GWP) that is calculated to reflect how long emissions remain in the atmosphere and how strongly the pollutant absorbs energy relative to CO_2. The GWP indicates the relative climate forcing of a given mass of emissions. Methane in the atmosphere over a 100-year horizon has a GWP of 25 according to the IPCC Fourth Assessment Report and 28 according to the IPCC Fifth Assessment Report, meaning that one pound of CH_4 causes the equivalent warming potential of 25 to 28 pounds of CO_2 (ARB, 2014a). When quantifying GHG emissions, the different GWP of each GHG pollutant is multiplied by the mass of that pollutant to arrive at a carbon dioxide-equivalent (CO2e) mass.

3.6.2 Regulatory Framework

Managing the GHG emissions from oil and gas development occurs within an evolving framework of plans, policies, regulations and goals primarily at the Federal and State levels. The U.S. Environmental Protection Agency (EPA) implements and enforces the requirements of most Federal environmental laws. EPA Region 9 administers Federal air programs in California. The U.S. EPA published a rule, in 2009, for the mandatory reporting of greenhouse gases from large sources, which is referred to as the Greenhouse Gas Reporting Program (GGRP). In general, the threshold for reporting is 25,000 metric tons or more of carbon dioxide equivalent per year, for stationary sources. Details on the GGRP and other related Federal and State regulations and policies are listed below. Although the Federal government is not required to comply with State plans and policies for GHG emissions, it is the general approach of the BLM to evaluate, where appropriate, the benefits or impacts of proposed actions on relevant State plans, in which to frame the issue and significance of greenhouse gas emissions and global warming.

Some local municipalities and local governments have policies on energy resources as part of local climate action plans. Where a local jurisdiction requires discretionary land use approvals for oil and gas activity, the cities or counties can regulate GHG emissions through the process of compliance with the California Environmental Quality Act (CEQA) to require project-specific mitigation of GHG emissions that are not subject to Federal, State, or local air quality management district controls.

Federal Laws, Regulations, and Agency Guidelines

CEQ NEPA Guidance for GHG Emissions and Climate Change Impacts

The Council on Environmental Quality (CEQ) released final guidance for Federal agencies on how to consider the impacts of their actions on global climate change in their NEPA reviews. This final guidance provides a framework for agencies to consider both the effects of a proposed action on climate change, as indicated by its estimated greenhouse gas emissions, and the effects of climate change on a proposed action. The final guidance applies to all types of proposed Federal agency actions that are subject to NEPA analysis and guides agencies to consider both the potential effects of a proposed action on climate change, as indicated by its estimated greenhouse gas emissions, and the implications of climate change for the environmental effects of a proposed action.

The guidance also emphasizes that agency analyses should be commensurate with projected greenhouse gas emissions and climate impacts, and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigations.

Executive Order 13693

In 2015, President Obama issued Executive Order 13693, Planning for Federal Sustainability in the Next Decade, with direction to Federal agencies to reduce direct GHG emissions 40 percent from 2008 levels, by 2025. The direction establishes agency-wide reductions of scope 1 and 2[1] GHG emissions in absolute terms, according to the definitions for reduction targets set within the order. Where appropriate, the targets shall exclude direct emissions from excluded vehicles and equipment and from electrical power produced and sold commercially to other parties as primary business of the agency.

The President's Climate Action Plan

The President's Climate Action Plan (Executive Office of the President, 2013) provides a wide range of goals for cutting carbon pollution and the strengthening preparedness, infrastructure and landscapes to the impacts of climate change and severe weather. This plan, along with the March 2014 Interagency Strategy to Reduce Methane Emissions (White House, 2014), identifies certain actions to cut carbon pollution and prepare for the impacts of climate change. Preparedness includes conserving land and water resources by implementing climate-adaptation strategies that promote resilience in fish and wildlife populations, forests, and other plant communities (Executive Office of the President, 2013). As part of the Climate Action Plan, the Department of Interior's BLM will update decades-old standards to reduce wasteful venting, flaring, and leaks of natural gas, which is primarily methane, from oil and gas wells. The BLM standards, finalized in November 2016 as the Waste Prevention, Production Subject to Royalties, and Resource Conservation,[2] will address both new and existing oil and gas wells on public lands. BLM will work closely with U.S. EPA to ensure an integrated approach (White House, 2015).

Department of Interior's Secretarial Order 3289

The Department of Interior's Secretarial Order 3289, Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources, includes the DOI Carbon Storage Project and the DOI Carbon Footprint Project to focus on carbon sequestration methodologies and carbon storage stewardship efforts. The Order also requires that each bureau and office of the Department must consider and analyze potential climate change impacts when undertaking long-range planning exercises.

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1 Executive Order 13693 includes the following definitions: Scope 1 emissions are those direct greenhouse gas emissions from sources that are owned or controlled by the agency; Scope 2 emissions are those direct greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by an agency.

2 See Federal Register Rule 81 FR 83008, Waste Prevention, Production Subject to Royalties, and Resource Conservation.

Social Cost of Carbon Direction

In support of Executive Order 12866, a Federal Interagency Working Group on the Social Cost of Carbon (SCC), convened by the Office of Management and Budget, developed a social cost of carbon protocol for use in the context of Federal agency rulemaking. The Interagency Working Group issued estimates of the social cost of carbon, which reflect the monetary cost incurred by the emission of one additional metric ton of CO_2.

U.S. EPA GHG Mandatory Reporting Program (40 CFR Part 98)

On October 30, 2009, the EPA published a rule for mandatory reporting of GHG from stationary sources emitting 25,000 or more metric tons of carbon dioxide equivalent (MTCO2e) per year. The regulation at Title 40 Code of Federal Regulations, Part 98, is referred to as the Greenhouse Gas Reporting Program. This rule applies to direct GHG emitters, fossil fuel suppliers, industrial gas suppliers, and facilities that inject carbon dioxide underground for sequestration or other purposes. The program does not require control of GHGs, rather it requires that sources above 25,000 MTCO2e per year monitor and report emissions and other related data.

The Petroleum and Natural Gas Systems source category of the GHG Reporting Program (40 CFR 98, Subpart W) includes most of the largest emission sources from the petroleum and natural gas industry. The following eight segments comprise the Petroleum and Natural Gas Systems source category.

- Onshore Production: Emissions from onshore production of petroleum and natural gas associated with production wells and related equipment, including GHG emissions from natural gas well completions and workovers with hydraulic fracturing. In November 2014, the EPA proposed expanding this segment of the rule to include not only natural gas wells but also reporting GHG from completions and workovers of oil wells using hydraulic fracturing.
- Offshore Production: Production of petroleum and natural gas from offshore production platforms.
- Natural Gas Processing: Processing of field quality gas to produce pipeline quality natural gas.
- Natural Gas Transmission: Compressor stations used to transfer natural gas through transmission pipelines.
- Underground Natural Gas Storage: Facilities that store natural gas in underground formations.
- Natural Gas Distribution: Distribution systems that deliver natural gas to customers.

U.S. EPA Federal Clean Air Act

The U.S. EPA Prevention of Significant Deterioration (PSD) and New Source Review programs under the Federal Clean Air Act (CAA) and implementing regulations (40 CFR Parts 51 & 52) require review of CO_2 emission control strategies for any new or modified stationary source that triggers PSD review. The permitting programs are enforced either by the local air quality management district or the U.S. EPA, depending on delegation of authority.

U.S. EPA Methane Challenge Program

The U.S. EPA sponsors the Natural Gas STAR Methane Challenge Program, which is a voluntary program that encourages oil and natural gas companies to commit to and adopt cost-effective technologies and practices to improve operational efficiency and prevent emissions of methane. The program defines protocols for methane control by oil and natural gas production companies that may operate many different facilities. Examples of cost-effective controls include, recovering for beneficial use all associated gas produced from oil reservoirs, regardless of well type, except for gas produced from wildcat and delineation wells or as a result of system failures and emergencies, and avoiding flaring when gas recovery is feasible.

State Laws and Regulations

California Governor's Executive Order S-3-05

The California Governor's Executive Order S-3-05 (June 2005) declares California's particular vulnerability to climate change and sets a target of an 80 percent reduction of California's greenhouse gas emissions from 1990 levels by 2050 and a target to achieve 1990 levels by 2020. In response to Executive Order S-3-05 and increasing societal concern about the effects of climate change, the California Legislature enacted California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). In passing the bill, the California Legislature found that:

> *Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems* [HSC Section 38501, Division 25.5, Part 1].

California Governor's Executive Order B-16-2012

Executive Order B-16-2012 (March 2012) specifically focuses on reducing emissions from the vehicle fleet across California and establishes that California shall achieve a target for 2050 of a reduction of GHG emissions from the transportation sector equaling 80 percent less than 1990 levels. This would be accomplished by achieving benchmarks by 2020 and 2025 for advancement of zero-emission vehicle (ZEV) infrastructure and technology advancement.

California Governor's Executive Order B-30-15

Executive Order B-30-15 (April 2015) establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. One purpose of this interim target is to ensure California meets the economy-wide target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050. This executive order also specifically addresses the need for climate adaptation and directs State agencies to update the State climate adaption strategy to identify how climate change will affect California infrastructure and industry and what actions the State can take to reduce the risks posed by climate change.

California Global Warming Solutions Act of 2006 (AB 32)

The Global Warming Solutions Act of 2006 (AB 32) set the 2020 greenhouse gas emissions reduction goal into law and requires California to maintain and continue reductions beyond 2020. It also directed the California Air Resources Board (ARB) to develop discrete early actions to reduce GHG and prepare a scoping plan to identify how best to reach the 2020 limit. ARB adopted 427 million metric tons of carbon dioxide equivalent (MMTCO2e) as the 2020 statewide target and mandatory reporting requirements in December 2007 (ARB, 2007), and staff updated the 1990 level to 431 MMTCO2e in 2014 (ARB, 2014b).

The AB 32 Scoping Plan (ARB, 2008) identifies the strategies for achieving the maximum technologically feasible and cost-effective economy-wide GHG reductions by 2020, and to maintain and continue reductions beyond 2020. This includes oil and gas measures and regulations that are under development. The first statewide AB 32 Scoping Plan was adopted by ARB in December 2008, and the ARB approved the First Update to the Scoping Plan in May 2014 (ARB, 2014a). The ARB has also released a Concept Paper (ARB, 2015a) that presents additional ideas for controlling methane from oil and gas operations, and from landfills, as part of a new statewide strategy for short-lived climate pollutants.

AB 32 Scoping Plan Measures

The AB 32 Scoping Plan contains a mix of direct regulations, market-based approaches, voluntary measures, policies, and other emission reductions calculated to limit California's GHG emissions to no greater than the 2020 statewide GHG limit and to initiate the transformations needed to achieve the long-range AB 32 objectives beyond 2020 (ARB, 2014b). The ARB monitors progress in meeting the 2020 limit, and the First Update of the Scoping Plan finds California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32 (ARB, 2014a, ARB, 2014b).

The 2008 AB 32 Scoping Plan identified a potential reduction of 1.1 MMTCO2e for two oil and gas industry measures, as follows:

- **AB 32 Scoping Plan Industry Measure I-2. Oil and Gas Extraction GHG Emission Reduction.** Controls for the fugitive sources range from applying simple fixes to existing technologies, to deploying new technologies to replace inefficient equipment and detect leaks. These controls could include: installing compressor rod packing systems; substituting high bleed with low bleed pneumatic devices; improving leak detection; replacing older equipment (flanges, valves, and fittings); and installing vapor recovery devices. These are proven technologies in the EPA's voluntary efficiency program, Natural Gas STAR, which may achieve a short payback of capital costs. This measure could specify improvements at new wells or existing wells, including those undergoing well stimulation treatments. In April 2015, the ARB released draft regulation text to implement this measure, and adoption will include an environmental analysis of the final regulation.
- **AB 32 Scoping Plan Industry Measure I-3. GHG Leak Reduction from Oil and Gas Transmission.** This measure could include improving operating practices to reduce emissions when compressors along the pipeline are taken off-line, installing compressor rod packing systems and replacing older equipment (flanges valves and fittings) along the pipelines. It is anticipated that the measure would be based, to a large degree, upon the EPA's Natural Gas STAR program aimed at cost effective approaches to reducing methane emissions. This measure may also eventually address combustion sources that are not captured by the Cap-and-Trade Program. In 2015 and in response to Senate Bill 1371 (Leno, 2014), the CPUC is conducting rulemaking to implement this measure.

Mandatory Reporting of Greenhouse Gas Emissions (17 CCR 95100-95158)

The ARB Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, or mandatory reporting rule (MRR), applies to entities within certain regulated source categories, including sources related to "Petroleum and Natural Gas Systems" [17 CCR 95150], if combustion or process emissions for the facility exceed 10,000 MTCO2e per calendar year or if stationary combustion, process, fugitive, and vented emissions equal or exceed 25,000 MTCO2e or more per year [17 CCR 95151]. Vented emissions are defined as intentional releases of vapors to the atmosphere. Fugitive emissions are defined as unintentional releases of vapors to the atmosphere (ARB, 2013).

The definition of the Petroleum and Natural Gas Systems category and the procedures for calculating, monitoring, and reporting GHG emissions from various activities appear in 17 CCR 95150-95158. Certain well stimulation treatments at gas wells are specifically addressed in Section 95153(f), although oil wells are not specifically addressed for well completions. For well testing in Section 95153(j), ARB approved modifications to the rule in 2014 to clarify that reporting procedures apply to both oil wells and gas wells.

Cap-and-Trade Program (17 CCR 95800 to 96022)

The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) was approved by ARB in October 2011. The Cap-and-Trade Program applies to covered entities that fall within certain source categories, including operators of facilities of Petroleum

and Natural Gas Systems [17 CCR 95852(h)] with emissions exceeding 25,000 MTCO2e in any data year, as evidenced through the MRR requirements. Fuel suppliers became covered on January 1, 2015 for the 2015 combustion emissions of the fuel delivered to end-users that are not otherwise covered entities in the Cap-and-Trade Program.

Covered entities comply with the statewide emissions cap and the Cap-and-Trade Program by submitting eligible compliance instruments equivalent to their GHG emissions by November 1 of each year. Valid compliance instruments include allowances and compliance offset credits (up to an 8 percent usage limit) issued by ARB. Each compliance instrument represents one metric ton of carbon dioxide equivalent. The first surrender date for the initial 30 percent of 2013 vintage emissions was November 1, 2014 [17 CCR 95856].

Low Carbon Fuel Standard (17 CCR 95480-95490)

The ARB adopted a Low Carbon Fuel Standard (LCFS) in 2009 to reduce statewide GHG emissions by reducing the full fuel-cycle, carbon intensity of transportation fuels. The regulation is designed to stimulate the production and use of alternative, low-carbon fuels in California. The LCFS applies to all providers of transportation fuels in California, including gasoline, diesel, compressed natural gas, and fuel blends. Fuel suppliers must demonstrate that the mix of fuels they provide meet the carbon intensity standards of the LCFS. Under the LCFS, the carbon intensity is a measure of the GHG emissions associated with the various production, distribution, and use steps in the "life-cycle" of a transportation fuel.

California Regulations on Well Stimulation Treatments (SB 4)

Operators on Federal lands in California are required to obtain permits/approvals for well stimulation treatments from both the Department of Conservation (DOC) Division of Oil, Gas and Geothermal Resources (DOGGR) and BLM. In 2013, Senate Bill Number 4 (SB 4) amended certain portions of the Public Resources Code (the State's laws for the conservation of petroleum and gas) to mandate a regulatory process and an environmental review of well stimulation treatments. Under SB 4, the various State, regional and local agencies involved with oversight of oil and gas activities, including local air quality management districts, must work in collaboration with DOGGR to establish their respective authority, responsibility, notification, and reporting requirements with respect to well stimulation treatments. The environmental studies required by SB 4 considered atmospheric emissions, including potential GHG emissions and the potential degradation of air quality due to well stimulation treatments, including hydraulic fracturing treatments and acid well stimulation treatments.

California Governor's Office of Planning and Research, Guidelines on GHG (SB 97)

In late December 2009, the California Natural Resources Agency adopted certain amendments to the State CEQA Guidelines for reviewing the environmental impacts of greenhouse gas emissions, to implement the California Legislature's directive in PRC Section 21083.05 (enacted as part of SB 97 (Chapter 185, Statutes, 2007)). These amendments became effective in March 2010. As part of the administrative rulemaking process, the Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. The Final Statement of Reasons guides the scope of GHG analyses for CEQA documents and addresses the subject of life-cycle analysis.

Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in developing a given project and infrastructure) depends on emission factors or econometric factors that are not well established for all processes. The basis of State CEQA Guidelines set forth by the California Natural Resources Agency indicate that a full life-cycle analysis would be beyond the scope of a given CEQA document because of a lack of consensus guidance on life-cycle analysis methodologies.

3.6.3 Regional Setting

The oil and gas enterprise worldwide is responsible for a large fraction of the total GHGs emitted to the atmosphere. By far the largest factor in these emissions is burning the fuel, not producing it (CCST, 2014). Anthropogenic activity globally results in approximately 49,000 MMTCO2e of annual GHG emissions (IPCC, 2014), and the U.S. GHG inventory for 2012 was 6,526 MMTCO2e (EPA, 2015), or roughly 14 percent of the global emissions. Oil and gas production across the U.S. results in about 224 MMTCO2e annually (EPA, 2015), with about 20 MMTCO2e of annual GHG emissions being due to oil and gas extraction occurring in California (ARB, 2015b).

The Third U.S. National Climate Assessment, released on May 6, 2014, provides the most authoritative and comprehensive source of scientific information to date about climate-change impacts across all U.S. regions and on critical sectors of the economy. For the Southwest U.S., including the CCFO Planning Area, the National Climate Assessment emphasizes the risks to scarce water resources and states (U.S. GCRP, 2014):

> *Climate changes pose challenges for an already parched region that is expected to get hotter and, in its southern half, significantly drier. Increased heat and changes to rain and snowpack will send ripple effects throughout the region's critical agriculture sector, affecting the lives and economies of 56 million people — a population that is expected to increase 68 percent by 2050, to 94 million. Severe and sustained drought will stress water sources, already over-utilized in many areas, forcing increasing competition among farmers, energy producers, urban dwellers, and plant and animal life for the region's most precious resource.*

Climate Change Indicators and Evidence

Climate scientists make global-scale observations and construct models of the climate system. For the period 1950 onward, relatively comprehensive data sets of observations are available. Consensus expressed by the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) shows that: "warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC, 2013).

Changing temperatures, precipitation, storm activity, sea levels, ocean currents, and wind patterns are indicators and evidence of the effects of climate change. Various indicators and evidence illustrate the many aspects of climate change, namely, how temperature and precipitation are changing, and how these changes are affecting the environment, specifically freshwater and marine systems, as well as humans, plants and animals (OEHHA, 2013). Since California's initial GHG strategy set forth in the 2008 AB 32 Scoping Plan, the scientific evidence has continued to indicate that the climate is changing. This evidence includes rising temperatures, shifting snow and rainfall patterns, and increased incidence of extreme weather events (ARB, 2014a).

3.6.4 Current Conditions and Trends

How global climate change may impact California's public health, infrastructure and natural resources is described in the 2009 Biennial Report of the California Climate Action Team (CAT, 2009) and Our Changing Climate 2012 from the California Climate Change Center (CEC, 2012). The Climate Action Team findings include: "extreme events from heat waves, floods, droughts, wildfires and bad air quality are likely to become more frequent in the future and pose serious challenges to Californians. These impacts pose growing demands on individuals, businesses and governments at the local, State, and Federal levels to minimize vulnerabilities, prepare ahead of time, respond effectively, and recover and rebuild with a changing climate and environment in mind" (CAT, 2009).

Additional research by the CalEPA Office of Environmental Health Hazard Assessment (OEHHA) identifies climate change drivers, observed changes in climate, how natural physical systems respond, and emerging issues. The documented effects of climate change also include impacts on terrestrial, marine, and freshwater biological systems, with resulting changes in habitat, agriculture, and food supply. Examples of the terrestrial effects include increasing tree mortality, large wildfires, and changes in vegetation density and distribution (OEHHA, 2013). The Regulatory Framework identified in Section 3.6.2 illustrates how oil and gas leasing and development decisions made by the BLM must plan for climate change, which may include effects to biological resources, water resources, and agricultural resources.

California Greenhouse Gas Emission Inventory

California's initial GHG management strategy was set forth in 2008 with the AB 32 Scoping Plan, when the State produced approximately 490 MMTCO2e, an amount equal to about 540 million tons, according to the Air Resources Board inventory (ARB, 2015b). One metric ton (MT) equals 1,000 kilograms, which is 2,204.6 pounds or about 1.1 short tons. For 2013, California's emissions were approximately 459 MMTCO2e (ARB, 2015b) or less than one percent of the 49,000 MMTCO2e emitted globally. Table 3.6-1 summarizes the existing inventory for California.

Table 3.6-1. California GHG Emissions Inventory (million metric tons per year)

Source Category	2008 (MMTCO2e)	2009 (MMTCO2e)	2010 (MMTCO2e)	2011 (MMTCO2e)	2012 (MMTCO2e)	2013 (MMTCO2e)
Transportation[1]	177.77	171.19	170.27	168.00	167.36	169.02
Electric Power	120.14	101.32	90.30	88.04	95.09	90.45
Industrial[2]	91.36	88.79	92.12	91.97	92.52	92.68
Commercial and Residential	43.47	43.70	44.88	45.40	42.88	43.54
Recycling and Waste	8.27	8.39	8.46	8.75	8.77	8.87
High GWP	12.61	13.83	15.49	16.78	17.77	18.50
Agriculture	36.48	34.86	34.50	35.68	36.43	36.21
Total Emissions	**490.1**	**462.1**	**456.0**	**454.6**	**460.8**	**459.3**

Notes:
1 - Transportation category includes off-road equipment used in construction, mining, oil drilling, and other vehicles and mobile sources.
2 - Industrial category includes refineries, oil and gas extraction, and other industries including combustion of fuels plus fugitive emissions.
Source: ARB, 2015b. California Greenhouse Gas Inventory for 2000-2013, by Category as Defined in the 2008 Scoping Plan.

Central Coast Field Office Planning Area

The effects anticipated in the Central Valley provide an illustration of the potential changes: the number of days conducive to ozone formation in the San Joaquin Valley may rise by 75 to 85 percent by the end of the century; and sea-level rise may place additional pressure on the levee systems and increase the intensity of saltwater intrusion into coastal groundwater resources, leading to increased flooding and decreased freshwater availability (CAT, 2006; CAT, 2009). The California Climate Change Center notes that the agricultural resources of the Salinas Valley are particularly vulnerable (CEC, 2012).

Leases Subject to Settlement Agreement

Leases subject to the settlement agreement occur in the North Central Coast air basin and in the jurisdiction of the MBUAPCD. There are no leases subject to the settlement agreement located in the San Joaquin Valley air basin or the San Francisco Bay Area air basin. The discussion of Climate Change Indicators and Evidence for California and the CCFO Planning Area would be the same for these leases. Oil and gas leasing and development that is subject to the settlement agreement would also be subject to the Regulatory Framework identified in Section 3.6.2.

3.7 Groundwater Resources

This section provides a description of the affected environment for Groundwater Resources for the BLM-administered Federal mineral estate within the CCFO Planning Area. EIS Section 3.7.1 provides an introduction to Groundwater Resources. EIS Section 3.7.2 summarizes relevant State and Federal regulations and standards associated with this analysis. EIS Section 3.7.3 describes the regional setting for Groundwater Resources. EIS Section 3.7.4 discusses the current conditions for Groundwater Resources within the CCFO Planning Area, the leases subject to settlement agreement, and the four fields most likely to be used for future oil and gas development.

3.7.1 Introduction

Groundwater, one of California's most important natural resources, is essential to agriculture and other sectors of the economy, and provides 30 million Californians — about 75 percent of the population — with at least a portion of their drinking water (State Water Board, 2015). In a typical year, groundwater provides about 40 percent of California's urban and agricultural water demands. In extended or extreme drought years, this percentage increases to 60 percent or more. Groundwater use will increase as California's projected population grows to more than 50 million by 2049.

Groundwater is the water occurring beneath the earth's surface that fills the voids in rocks or sediment. It can be found underlying nearly any location in California, including areas underlain by bedrock. Most of the groundwater used in California occurs in alluvial deposits of stream-laid unconsolidated to semi-consolidated gravel, sand, silt, and clay. These deposits typically occur in thin lenses and beds. Coarse-grained sediments (sand and gravel) usually provide the best source of groundwater and are termed aquifers; finer-grained clay and silt deposits are relatively poor sources of groundwater and are referred to as aquitards.

A groundwater basin — typically underlying a valley or coastal plain — contains one or more connected and interrelated aquifers and often represents a groundwater reservoir capable of providing substantial water supply. The California Department of Water Resources (CDWR) defines groundwater basins throughout California, designating 515 basins and subbasins. CDWR numbered the groundwater basins according to nine Regional Water Quality Control Board boundaries, three of which are within the CCFO Planning Area: San Francisco Bay (Region 2), Central Coast (Region 3), and Central Valley (Region 5). Many basins also contain oil and gas fields. The CDWR-designated groundwater basins and oil and gas fields in the CCFO Planning Area are shown on Figure 3.7-1. The boundaries or limits of a groundwater basin often consist of low-permeability bedrock or a geologic structure such as a fault. The bottom often is bedrock (generally less than 2,500 feet deep); in the deep Central Valley formations, the base of fresh water is considered the bottom of a basin (CDWR, 2003).

All groundwater contains dissolved constituents; the types and concentrations depend on the source, environment, and movement of the groundwater. A measure of the general mineral quality of groundwater is total dissolved solids (TDS) expressed in milligrams per liter (mg/L). Typically, groundwater has higher concentrations of dissolved constituents than surface water because of its longer exposure to soluble materials (e.g., salts) in rocks or sediments. Moreover, groundwater salinity tends to increase with depth in a groundwater basin, reflecting the long, slow pathways that groundwater travels at depth, or in some cases, the presence of ancient seawater that has not been flushed from deep marine sediments.

Most of the groundwater used in California contains TDS concentrations of less than about 3,000 mg/L. However, the desalination of brackish or saline groundwater supplies has increased significantly in the last two decades (CDWR, 2013a). This increase results from improved technology that has lowered the cost of treatment — a cost that has been justified in part through an increase in water demand. Increased water demand has also resulted in the increased use of lower-quality groundwater when appropriate. In the BLM final rule for Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands (43 CFR Part

3160), usable water is defined as waters containing less than 10,000 mg/L TDS. This is consistent with the U.S. Environmental Protection Agency definition of Underground Sources of Drinking Water (see 40 CFR 144.3 for the complete USDW definition). The BLM hydraulic fracturing rule also excludes zones designated as exempted aquifers under 40 CFR 144.7 from the definition of usable water. Exempted aquifers include specially designated aquifers that meet the criteria of the definition of Underground Sources of Drinking Water but which have been exempted according to the criteria provided in 40 CFR 146.4 (Criteria are included in the discussion of the State Underground Injection Control Program in Section 3.7.2 below. Exempt Aquifers in the CCFO Planning Area are discussed in Section 3.7.4 and listed in Table 3.7-3). Additional qualifications are also included in the full definition of usable water; see 43 CFR Part 3160 for the complete definition. For purposes of the Groundwater Resources sections of the EIS, the terms *usable water* and *usable groundwater* are interchangeable.

Groundwater quality and quantity are typically managed by a local public agency, such as a water district, irrigation district, municipality, or county. In September 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law. This legislation provides a framework for sustainable management of groundwater resources by local agencies. Additional details of the Act are provided in Section 3.7.2 in Regulatory Framework.

CDWR has historically provided funding and technical support for groundwater management and, pursuant to Water Code Section 10920 et seq., has implemented the California Statewide Groundwater Elevation Monitoring (CASGEM) program. CASGEM is a statewide program primarily based on monitoring of groundwater levels by local parties. It also includes prioritization of California's 515 groundwater basins and subbasins using the following criteria:

- Overlying population
- Projected population growth
- Number of public supply wells
- Total number of wells
- Irrigated acreage
- Reliance on groundwater
- Groundwater impacts, including overdraft, subsidence, saline intrusion, and any other water quality degradation, and
- Any other information determined to be relevant by CDWR.

The prioritization is expressed in terms of very low, low, medium, or high. Of the 515 groundwater basins in California, 127 were assigned high and medium priority (CDWR, 2014). While the CASGEM program purpose for prioritizing basins is to help evaluate the need for additional groundwater level monitoring, the prioritization is also being used to prioritize groundwater sustainability plans under SGMA. For the EIS analysis, the prioritization provides a reasonable assessment of the relative importance of groundwater basins statewide. (It is not intended to diminish the local importance of groundwater in the smaller-size or lower-use groundwater basins.) Accordingly, the basins and subbasins with medium and high rankings are identified in the regional discussions of the Affected Environment section to identify the State's priority groundwater supplies.

Estimated volumes of groundwater use for each groundwater basin and subbasin (as compiled by CDWR in connection with the CASGEM prioritization process) also are considered for the groundwater quantity impacts analysis. CDWR cautions that these groundwater use data are current estimates and may be incomplete. Nonetheless, they represent the best available and most comprehensive groundwater use data that cover all of the State's groundwater subbasins.

3.7.2 Regulatory Framework

This section provides background information on Federal, State, and local regulations that apply to management of oil and gas resources, including well simulation and hydraulic fracturing, on BLM-administered mineral estate within the CCFO Planning Area. The RMPA relationship to existing BLM policies, plans and programs, and collaboration with other agencies and groups is discussed in RMPA/EIS Section 1.5 while Section 1.6 introduces Federal, State, and local laws that guide development of the RMPA. BLM's Enjoined Final Rule on Hydraulic Fracturing on Federal and Indian Lands is discussed in Section 1.5.1.

On Federal lands, BLM enforces BLM regulations and requires compliance with the provisions of other Federal agency regulations, such as compliance with the ESA, Antiquities Act, the SHPA, etc. In addition, it is California BLM policy to require per 43 CFR 3162.1(a), at the operations approval stage, that operators comply with all local and State regulations to the extent that they do not interfere with Federal lease rights or contradict Federal law. The State of California, through the Division of Oil, Gas and Geothermal Resources (DOGGR) enforces State regulations on all oil and gas operations on Public Lands in California. Operators on Federal lands in California are required to obtain permits/approvals, including those for well stimulation treatments, from both DOGGR and BLM.

Senate Bill Number 4 (SB 4, Chapter 313) was signed into State law in 2013 to establish a comprehensive regulatory program for oil and gas well stimulation treatments. As related to oil and gas well stimulation treatments, SB 4 amends Sections 3213, 3215, 3236.5 and 3401 of, and adds Article 3 (Sections 3150 through 3161) to, Chapter 1 of Division 3 of the Public Resources Code (the State's laws for the conservation of petroleum and gas), and adds Section 10783 to Part 2.76 (Groundwater Quality Monitoring) of the State's Water Code. Public Resources Code (PRC) Section 3161 was subsequently amended in 2014 by Senate Bill 861 (Statutes, 2014, Chapter 35). Under SB 4, the State, regional and local agencies are to work in collaboration with DOGGR to establish their respective authority, responsibility, notification, and reporting requirements with respect to well stimulation treatments. The following section provides more detail on regulations that apply to groundwater resources with regard to well stimulation technologies.

Federal

On BLM-administered land, BLM has statutory authority for regulation of oilfield operations through Oil and Gas Operations Regulations (43 CFR 3160), which govern operations associated with the exploration, development and production of oil and gas on Federal and Indian lands. In March 2015, BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands. On June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule. The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068).

BLM's final rule includes standards that provide new requirements to ensure well-bore integrity, to protect water quality, and to enhance the public disclosure of chemicals. These new requirements provide additional protection of usable water (defined as having less than 10,000 mg/L TDS; see 43 CFR Part 3160.0-5 for the complete definition). The rule also includes a process to allow states and tribes to request a variance from provisions for which they have an equal or more protective regulation in place.

The rule includes the following key protective measures for groundwater resources:

- Provisions for ensuring the protection of groundwater supplies from aquifers with less than 10,000 mg/L TDS by requiring a validation of well integrity and strong cement barriers between the wellbore and water zones through which the wellbore passes;
- Increased transparency by requiring companies to publicly disclose chemicals used in hydraulic fracturing to the BLM through the website FracFocus, within 30 days of completing fracturing operations;

- Higher standards for interim storage of recovered waste fluids from hydraulic fracturing to mitigate risks to air, water, and wildlife; and
- Measures to lower the risk of cross-well contamination with chemicals and fluids used in the fracturing operation, by requiring companies to submit more detailed information on the geology, depth, and location of preexisting wells to afford the BLM an opportunity to better evaluate and manage unique site characteristics.

In addition to BLM's final rule, two key Federal laws pertaining to groundwater resources are the Safe Drinking Water Act (SDWA) and Clean Water Act (CWA). The SDWA protects drinking water and its sources (rivers, lakes, reservoirs, springs, and groundwater). Under the SDWA, the EPA sets national health-based standards for drinking water and works with states and water suppliers to implement those standards. Private wells that supply fewer than 25 people are not regulated by the SDWA (EPA, 2014c). The EPA regulates waste disposal of flowback fluids and sometimes the injection of fracturing fluids as authorized by the SDWA and CWA. Protection of underground sources of drinking water is focused in the Underground Injection Control (UIC) program, which regulates the subsurface injection of fluid. Exclusions to UIC authority (SDWA Section 1421(d)) include:

- the underground injection of natural gas for purposes of storage, and
- the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities (EPA, 2014b).

Consequently, hydraulic fracturing is excluded from the SDWA unless diesel fuel is injected, in which case, an authorization through the applicable UIC program is needed. States have the option of requesting regulatory primacy for Class II wells under the SDWA (EPA, 2014a). Class II injection wells inject fluids associated with oil and gas production into subsurface zones for enhanced oil and gas recovery or wastewater disposal. In California, the State regulates the UIC program as discussed in more detail in RMPA/EIS Section 3.7.2.2.

Under the CWA, states or the EPA have the authority to regulate the discharge of produced waters from hydraulic fracturing operations. Disposal into surface waters is regulated by the National Pollutant Discharge Elimination System (NPDES) permit program (EPA, 2014b). In California, the State Water Resources Control Board (State Water Board) and its Regional Water Quality Control Boards (Regional Water Boards) administer the NPDES program. Section 1786 of the SB 4 Well Stimulation Treatment Regulations prohibits the disposal of flowback water to sumps or pits in California.

The CWA established the basic structure for regulating discharges to navigable waters of the United States. The CWA does not directly address groundwater contamination but contains provisions that can be applicable to groundwater (Quattrocchi, 1996). Attempts to apply CWA authority to prevent groundwater contamination have met with mixed results in the courts. Some courts have ruled that the law specifically excludes groundwater while others say it can be regulated as long as the groundwater is hydrologically connected to jurisdictional surface water (InsideEPA.com, 2013). The CWA provides two general types of water quality control standards:

- Effluent standards, which are technology-derived standards that limit the quantity of pollutants discharged from a point source such as a pipe, ditch, tunnel, etc., into a navigable water body (non-point source pollution is subject to State control); and
- Ambient water quality standards, which are based on beneficial uses and limit the concentrations of pollutants in navigable waters.

The NPDES permitting system was established under CWA Section 402 to regulate discharges from point sources into navigable waters. Management of non-point source discharges is regulated under Section 319 of the CWA. Section 319 requires the states to submit an assessment report that identifies: (1)

navigable waters that are not expected to achieve applicable water quality standards or goals, (2) categories of non-point sources or specific sources that add significant pollution that contributes to non-attainment of water quality standards or goals, and (3) the process to develop best management practices and measures to control each category of non-point source or specific sources. The states are then required to develop a management program that proposes to implement the non-point source control program.

Section 305(b) of the CWA requires the states to perform a biannual assessment of the water quality of navigable water within the State. The assessment is required to analyze the extent to which beneficial uses are supported and provide an analysis of the extent to which elimination of pollution and protection of beneficial uses have been achieved. The assessment also is required to describe the nature and extent of non-point sources of pollution and provide recommendations for control programs that include costs.

Section 303(d) of the CWA requires states to identify waters that are not expected to meet water quality standards after application of effluent limitations, to develop a priority ranking, and to determine the total maximum daily load (TMDL) of specific pollutants that may be discharged into the water and still meet the water quality standards. Surface water quality regulations are discussed in EIS Section 3.8.

Groundwater quality and groundwater contamination also are managed through the Comprehensive Environmental Response and Liability Act (CERCLA) also known as Superfund (40 CFR Part 300). CERCLA provides funding and enforcement authority for the EPA to conduct hazardous waste site assessment and remediation including groundwater contamination. CERCLA requires the development of a National Priorities List (NPL) that documents contaminated sites at which long-term cleanup is required. Specific site locations can be queried at the EPA Region 9 website.

State

Groundwater Law in California. In California, the State Water Board administers surface water rights law. A water right is legal permission to use a reasonable amount of water for beneficial purposes (State Water Board, 2014). Statutory and case law in California distinguish between groundwater and surface water. Groundwater is considered either percolating or a subterranean stream flowing through known and defined channels (GRA, 2005). The State Water Board issues permits for diversion of subterranean stream water, which generally moves through permeable streambed material following the course of a stream. However, most groundwater in California is considered to be percolating groundwater, which is not regulated by the State Water Board unless it is being used for wasteful or unreasonable purposes or harms State resources, such as fisheries (State Water Board, 2014). Although not regulated by the State, some groundwater use can be regulated by local entities such as a county, groundwater management agency, or Groundwater Sustainability Agency (see information on 2014 Sustainable Groundwater Management Act below).

Overlying groundwater rights allow a landowner to use percolating groundwater on the overlying property. Overlying rights are usually not limited by history or frequency of use and are considered correlative rights where they are of equal priority to one another. If supply insufficiency exists, the water may be apportioned among the land owners by a court decree (Barkiewicz, 2006).

If groundwater is used elsewhere, it becomes an appropriative groundwater right; for example, municipal use is considered an appropriative groundwater right. Appropriative rights are limited by historical use and priority is determined on a first-in-time, first-in-right basis between appropriators. Appropriative groundwater rights are junior to overlying groundwater rights (GRA, 2005).

A third type of groundwater right is a prescriptive groundwater right and is acquired by someone who openly uses groundwater from someone who has an existing prior right (GRA, 2005). The use can become a right if it is open, continuous and uninterrupted for a period of five years (Barkiewicz, 2006).

Groundwater rights can also be quantified through adjudication. State courts and occasionally the State Water Board can adjudicate a groundwater basin if competing demands become too great and lawsuits arise. In an adjudicated basin, water rights are allocated to the users based on complex legal and factual issues. There is one adjudicated basin (Seaside Groundwater Basin, 3-4.08) in the CCFO Planning Area (CDWR, 2015a).

Sustainable Groundwater Management Act. In September 2014, Governor Brown signed three legislative bills (AB 1739, SB 1168, and SB1319) that together are known as the Sustainable Groundwater Management Act (SGMA). The legislation provides a framework for sustainable management of groundwater resources by local agencies, defined as a local public agency with water supply, water management, or land use responsibilities within a groundwater basin.

The legislation lays out a process and timeline for local agencies to achieve sustainability, including:

- Local agencies must form local groundwater sustainability agencies (GSAs) within two years;
- Local agencies in basins deemed medium- and high-priority must prepare groundwater sustainability plans (GSPs) within five to seven years (depending on the overdraft status of the basin); and
- When plans are in place, local agencies must implement the GSPs and achieve sustainability within 20 years.

A combination of local agencies may form a GSA; if a portion of a groundwater basin is not included within a GSA, the local county is presumed to be the GSA for that area.

The Sustainable Groundwater Management Act is directed at groundwater basins or subbasins that have been designated by CDWR as medium- or high-priority through the CASGEM program (see RMPA/EIS Section 3.7.1). Of the 515 groundwater basins in California, 127 were assigned high- and medium-priority (CDWR, 2014a). Of these, basins that have been, or are being, adjudicated are not subject to the entire Act, but have certain reporting requirements.

The legislation also provides local agencies with the tools to achieve sustainability, including specific authorities and procedures. For example, local agencies may:

- Conduct investigations to carry out the requirements of the Act;
- Require registration of wells and measurement of extractions;
- Require annual extraction reports;
- Impose well spacing requirements and limits on extractions from individual groundwater wells;
- Assess fees to implement local groundwater management plans; and
- Request a revision of basin boundaries, including establishing new subbasins.

CDWR has the responsibility to review GSPs for compliance. In basins where (1) a GSA is not formed in a timely manner, (2) a GSP is determined to be inadequate, or (3) groundwater sustainability is deemed unlikely to be achieved, the State Water Board can designate a basin as probationary and intervene with an interim plan to protect groundwater resources.

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) of 1969, which became Division 7 of the California Water Code, authorized the State Water Board to provide comprehensive protection for California's waters through water allocation and water quality protection. The State Water Board implements the requirements of CWA Section 303 (that water quality standards be set for certain waters) by adopting water quality control plans through the Porter-Cologne Act. The Porter-Cologne Act also established the responsibilities and authorities of the State's nine Regional Water Boards. These responsibilities and authorities include preparing water quality plans for areas within the region (Basin Plans), identifying water quality objectives (WQOs), and issuing NPDES permits pursuant to the Clean Water Act. WQOs are defined as limits or levels of water quality constituents and characteristics established for reasonable protection of beneficial uses or prevention of nuisance.

California's Antidegradation Policy (Resolution No. 68-16) was adopted in 1968 to protect and maintain existing water quality in California. It is intended to incorporate the Federal antidegradation policy and satisfy Federal regulations requiring states to adopt their own antidegradation policy. It applies to only high-quality waters and is incorporated into the Basin Plans. Existing high-quality water must be maintained to the maximum extent possible. The Antidegradation Policy applies to groundwater and surface water with quality that meets or exceeds WQOs. Several conditions must be met before the quality of high-quality waters may be lowered by waste discharges including the following: provide consistency with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, not result in water quality less than the WQOs, and meet waste discharge requirements that result in best practicable treatment or control of the discharge.

Basin Plans designate beneficial uses for surface and groundwater and establish objectives (narrative and numerical) for protection of the designated beneficial use. Implementation programs to protect beneficial uses and monitoring activities to evaluate the effectiveness are also described in the Basin Plans.

Basin Plans are implemented largely through the NPDES permitting program and updated by TMDL analyses to regulate waste discharges so that water quality objectives are met. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards and an allocation of that load among the various sources of that pollutant.

In addition to implementing the NPDES permitting program, the Porter-Cologne Act authorizes the RWQCBs to issue Waste Discharge Requirements (WDRs), which are issued to dischargers of point-source effluent to a surface water body. Generally, WDRs are issued for discharges that are exempt from the CWA NPDES permitting program, discharges that may affect groundwater quality, and/or wastes that may be discharged in a diffused manner. WDRs are established and implemented to achieve the WQOs for receiving waters as established in the Basin Plans. The WDR permit also serves as a federally required NPDES permit (under the CWA) and incorporates the requirements of other applicable regulations.

As of July 1, 2014, the State Water Board also regulates drinking water from public water systems, including groundwater sources, through its new Drinking Water Division. The Drinking Water Division also provides information on drought preparedness, water conservation, and water supply emergency response; oversees water recycling projects; certifies drinking water treatment operators, supports research; and provides funding opportunities for water system improvements including funding under Proposition 84, Proposition 50, and the Safe Drinking Water State Revolving Fund. The drinking water program was previously administered through the California Department of Public Health, Division of Drinking Water and Environmental Management (DDWEM), but was transferred to the State Water Board in July 2014.

California Groundwater Monitoring Programs. In addition, the State Water Board is responsible for implementation of California's Groundwater Quality Monitoring Act of 2001. Through a cooperative program with the USGS, the State Water Board has developed the basis for a comprehensive groundwater quality monitoring program that integrates existing water quality monitoring programs and provides the capability of assessing the groundwater quality of each groundwater basin in the State.

In 2009, a bill that developed a statewide groundwater elevation monitoring program was enacted in California. Authorized under SBX7 6, the California Ambient Statewide Groundwater Elevation Monitoring (CASGEM) program provides for the monitoring of groundwater levels by local monitoring entities or the CDWR in each of the State's groundwater basins and subbasins. The objective of the program is to establish a permanent, locally managed program of regular and systematic groundwater elevation monitoring program in all of California's alluvial groundwater basins.

Drinking Water Source Water Assessment Program (DWSAP). In response to 1986 amendments and the 1996 reauthorization of the SDWA, states are required to develop a wellhead protection program and a drinking water source assessment program (DWSAP) for wells in public drinking water systems. Two

key goals of the programs are to protect and improve drinking water quality and support management of the State's water resources. The program involves the delineation and protection of recharge areas that could impact groundwater in drinking water supply wells. California's DWSAP was first developed and implemented by the Department of Health Services (DHS) Division of Drinking Water and Environmental Management, the lead agency in 1996. The program is now operating under the authority of the State Water Resources Control Board, Division of Drinking Water (DDW). There are 14,326 groundwater sources of drinking water (wells) that are included in the statewide DWSAP, about 1,500 of which are estimated to be within the CCFO Planning Area. Due to security concerns, specific locations of these drinking water sources are not generally available to the public.

Underground Injection Control (UIC) Program for Class II Wells. In California, DOGGR regulates wells that inject fluids associated with oil and gas production (Class II injection wells) through its UIC Program. The program is monitored and audited by the EPA under the SDWA. The UIC Program includes permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach in connection with underground injection activities (DOC, 2014). Surface disposal is overseen by the Regional Water Boards and disposal of oil field produced water into deep injection wells is overseen by DOGGR.

Under agreement between the EPA and DOGGR, aquifers may be designated as "exempt" for the purposes of the UIC program only, which allows injection into aquifers. To be eligible for exemption an aquifer must meet criteria set forth in 40 CFR 146.4(a) and either (b) or (c):

(a) The aquifer does not currently serve as a source of drinking water; and

(b) The aquifer cannot now and will not in the future serve as a source of drinking water because:

(1) It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated to contain minerals or hydrocarbons that, considering their quantity and location, are expected to be commercially producible; or

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or

(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class II well mining area subject to subsidence or catastrophic collapse; or

(c) The total dissolved solids content of the ground water is more than 3,000 mg/L and less than 10,000 mg/L and it is not reasonably expected to supply a public water system.

DOGGR has to approve the designation of the exempt aquifers. Details of the UIC program are currently under review by DOGGR and are subject to revision, including the exemption status of previously exempt aquifers. Prior to revision, exempt aquifers exist beneath six oil and gas fields within the CCFO Planning Area:

- Monroe Swell and San Ardo in southern Monterey County, and
- Coalinga, Guijarral Hills, Jacalitos, and Kettleman North Dome in western Fresno County.

UIC well construction and UIC injection projects are also regulated under 14 CCR 1724.6, 1724.7, and 1724.10. These regulations stipulate the data and analysis that must be approved before any subsurface injection or disposal project can begin. Data include reservoir characteristics, well diagrams (including cement seals), geologic studies, and injection project details. Chemical analyses of the liquid being injected are also required.

Oil and Gas Well Regulations. Development, regulation, and conservation of oil and gas resources in the State are addressed under 14 CCR, Chapter 4. These regulations include, among other operations, the construction of oil and gas wells, including those used in well stimulation treatments. Specifically, sections 1722.3 and 1722.4 provide requirements for casing strings and cementing that are protective of groundwater resources. In particular, annular cement seals are required to extend to at least 100 feet above the base of fresh water and at least 500 feet above oil and gas zones. On BLM-administered land, BLM has statutory authority for regulation of oilfield operations through Oil and Gas Operations Regulations (43 CFR 3160), which govern operations associated with the exploration, development and production of oil and gas on Federal and Indian lands. The Onshore Oil and Gas Orders clarify and supplement the 43 CFR 3160 regulations and the Notices-To-Lessees (NTLs) supplement or clarify the 43 CFR 3160 for oil and gas operations for specific types of activities or to address local or regional issues. BLM acts as a NEPA lead or responsible agency and consults with DOGGR to facilitate CEQA compliance as appropriate (40 CFR Part 1500).

Groundwater Monitoring under SB 4. SB 4 required development of specific well stimulation treatment regulations including groundwater monitoring requirements. Well simulation fluid composition data and electronically submitted water quality data also are required (DOC, 2015). Under SB 4, the State Water Board is required to:

- Consult with DOGGR during DOGGR's development of regulations for well stimulation treatments.
- Enter into a formal agreement with DOGGR regarding roles and responsibilities in the regulation of well stimulation treatments.
- Designate one or more qualified third-party contractors that adhere to board-specified standards and protocols to perform property owner requested water quality sampling and testing. In those areas where BLM is the surface owner, BLM will be notified as appropriate and provided an opportunity to request testing of any existing usable water, whether from a water well or surface waters.
- Audit and review sampling and testing conducted by the third-party contractor(s).
- Develop groundwater monitoring model criteria by July 1, 2015, in consultation with DOGGR and other stakeholders that outline the approach to be implemented either on a well-by-well basis for a well subject to well stimulation treatments, or on a regional scale.
- Begin implementation of a regional groundwater monitoring program by January 1, 2016, based on the developed criteria (DOC, 2015, Section 10783; State Water Board, 2015).

The report *Model Criteria for Groundwater Monitoring* (Model Criteria) was adopted by the State Water Board at their July 7, 2015 Board Meeting (State Water Board, 2015). The Model Criteria report describes the methods for assessment, sampling, analytical testing, and reporting of water quality associated with oil and gas well stimulation activities. The criteria are for the monitoring of protected groundwater defined as having TDS concentrations less than 10,000 mg/L and outside of exempt aquifers. The groundwater monitoring data will be used to establish baseline conditions prior to well stimulation and to then evaluate data and test results to document water quality changes. Results will be used to determine whether additional monitoring or corrective actions are necessary. The Model Criteria was used by the State Water Board to implement a regional groundwater monitoring program, which began January 1, 2016. The Model Criteria is also being used by oil and gas operators to implement area-specific groundwater monitoring near well stimulation activities. Area-specific groundwater monitoring plans and subsequent groundwater monitoring reports are to be submitted to and approved by the State Water Board. Groundwater monitoring plans are to contain site-specific information including geology, geophysics, hydrogeology, geochemistry, and current and past field operations. Major components of the monitoring program include establishing baseline water quality conditions, identifying a minimum of one upgradient and two downgradient monitoring wells for each aquifer with wells located within 0.5 miles of the surface projection of the zone(s) of stimulation, locating sentry monitoring wells between the stimulated well(s)

and drinking water supply wells if the supply wells are within 1 mile of zone of stimulation, and providing maps and cross sections showing various oil field, well and boundary components, among other requirements.

Samples are to be collected before and after well stimulation with area-specific groundwater sampling to occur on a semi-annual basis and analyzed for constituents provided in Table B1 or Table B2 (if potential impacts) of Appendix B of the Model Criteria report or as modified by the State Water Board. Groundwater monitoring reports and associated water quality data are to be submitted to the State Water Board in an electronic format and uploaded to the online GeoTracker groundwater information system.

The regional monitoring program conducted by the State Water Board will be implemented in phases with the first phase taking approximately five years and focusing on identifying vulnerable beneficial use water resources and establishing baseline water quality conditions. The next phase will consist of establishing a vulnerability model to consider ranking levels of relative risk to groundwater resources. The regional monitoring program will characterize and monitor zones of groundwater risk, effects of surface activity, and well integrity and groundwater quality.

Local

Local agencies also have authority over groundwater resources through three general means:

- Management under the authority granted by the California Water Code or other State statutes
- Local government ordinances or joint powers agreements, and
- Court adjudications.

Many local agencies authorized by statute to provide water have statutory authority to institute some form of groundwater management. In addition, greater groundwater management authority has been granted to 13 special act districts (CDWR, 2014b). Three of these (Monterey Peninsula Water Management District, Pajaro Valley Water Management Agency, and Santa Clara Valley Water District) are within the CCFO Planning Area.

Cities and counties can also manage groundwater through ordinances. More than half of California's 58 counties have ordinances addressing groundwater management. A 1994 California Court of Appeal decision concluded that State law does not prevent cities and counties from adopting ordinances to manage groundwater under their police powers. (*Baldwin v. County of Tehama* (1994) 31 Cal.App.4th 166). However, the extent to which cities and counties can regulate groundwater remains uncertain (CDWR, 2014b). In the CCFO Planning Area, four counties — San Joaquin, San Benito, Monterey, and Fresno — have adopted groundwater ordinances (CDWR, 2003). Three of these ordinances (San Joaquin, San Benito, and Fresno) either prohibit the export of groundwater outside of the basin from which it is extracted or require a permit to do so. The ordinance for Monterey County regulates extraction facilities in zones of groundwater problems including seawater intrusion.

Local agencies have recently been provided considerable new powers, most notably the power to regulate pumping, by the Sustainable Groundwater Management Act (SGMA) as described above. It authorizes designated groundwater sustainability agencies to conduct investigations to carry out the requirements of the act, register wells and monitor pumping, prepare annual extraction reports, impose well spacing requirements and limit pumping, and assess fees to fund groundwater management and replenishment activities, among other actions.

Court adjudications are a result of lawsuits and the groundwater rights of all the overliers and appropriators are determined by the court. There are 23 adjudicated groundwater basins in California and one adjudicated stream system (CDWR, 2015a). Within the CCFO Planning Area, only the Seaside Groundwater Basin (portion of CDWR basin designation 3-4.08) in Monterey County is adjudicated. No oil and gas fields or Federal mineral estate overlie the Seaside Groundwater Basin.

3.7.3 Regional Setting

The EIS/RMPA study area consists of the CCFO Planning Area shown on Figure 3.7-1. The map includes CCFO Planning Area boundaries, CDWR groundwater basins and subbasins (designated by CDWR basin numbers), Federal mineral estate, and oil and gas fields (including abandoned fields). Federal mineral estate is shown in both green and purple to identify the Federal leases subject to the settlement agreement (in purple). As shown on Figure 3.7-1, the settlement agreement leases are generally located in the southern portions of the CCFO Planning Area in southern Monterey and San Benito Counties.

Also shown on Figure 3.7-1 is the area considered by BLM to contain the highest potential for oil and gas occurrence. This high-potential area generally covers the southern Salinas Valley of Monterey County, southeastern San Benito County (east of the San Andreas Fault zone), and the western flank of the San Joaquin Valley including portions of western Fresno, Merced, and Stanislaus Counties (Figure 3.7-1). Most of the Federal mineral estate in the CCFO Planning Area occurs within the areas of high-potential oil and gas occurrence.

As shown on Figure 3.7-1 and listed in Table 3.7-1, there are 41 active or abandoned oil and gas fields in the CCFO Planning Area. Only 13 of these fields contain Federal mineral estate (see fields in bold font in Table 3.7-1). All but one of these 13 fields (abandoned Quinado Canyon) are located within a portion of one or more CDWR groundwater basins or subbasins.

Table 3.7-1. Existing Oil and Gas Fields in the Central Coast Field Office Planning Area

County[1]	Oil and Gas Field		Within a Groundwater Basin?	Includes Federal Mineral Estate?
Alameda	1	Hospital Nose Gas (abandoned)	yes	no
	2	Livermore	yes	no
Contra Costa	3	Bixler Gas	yes	no
	4	Brentwood	yes	no
	5	Brentwood, East Gas	yes	no
	6	Concord Gas (abandoned)	yes	no
	7	**Dutch Slough Gas**	**yes**	**yes**
	8	Knightsen Gas (abandoned)	yes	no
	9	**Los Medanos Gas**	**yes**	**yes**
	10	Mulligan Hill Gas	no	no
	11	Oakley Gas (abandoned)	yes	no
	12	Oakley Gas, South	yes	no
	13	Pinole Point (abandoned)	no	no
	14	Rio Vista Gas	yes	no
	15	River Break Gas	yes	no
	16	Sand Mound Slough Gas (abandoned)	yes	no
	17	Sherman Island Gas	yes	no
	18	Van Sickle Island Gas	no	no
	19	**Willow Pass Gas (abandoned)**	**yes**	**yes**
Fresno	**20**	**Coalinga**	**yes**	**yes**
	21	**Coalinga, East Extension**	**yes**	**yes**
	22	**Guijarral Hills**	**yes**	**yes**
	23	**Jacalitos**	**yes**	**yes**
	24	**Kettleman North Dome**	**yes**	**yes**
	25	Kreyenhagen	no	no
	26	**Pleasant Valley**	**yes**	**yes**

Table 3.7-1. Existing Oil and Gas Fields in the Central Coast Field Office Planning Area

County [1]	Oil and Gas Field	Within a Groundwater Basin?	Includes Federal Mineral Estate?
Monterey	27 King City (abandoned)	yes	no
	28 Lynch Canyon	yes	no
	29 McCool Ranch	yes	no
	30 Monroe Swell	**yes**	**yes**
	31 Paris Valley	yes	no
	32 Quinado Canyon (abandoned)	**no**	**yes**
	33 San Ardo	**yes**	**yes**
San Benito	34 Bitterwater	yes	no
	35 Hollister	yes	no
	36 Vallecitos	**yes**	**yes**
San Mateo	37 Half Moon Bay	yes	no
	38 La Honda	no	no
	39 Oil Creek	no	no
Santa Clara	40 Moody Gulch (abandoned)	no	no
	41 Sargent	no	no

1 - No existing oil and gas fields in Merced, San Francisco, San Joaquin, Santa Cruz, or Stanislaus Counties.
2 - Oil and gas fields shown in **bold** contain Federal mineral estate.

Groundwater Basins in the CCFO Planning Area

There are 66 groundwater basins or subbasins that are either wholly or partially located within the CCFO Planning Area (Figure 3.7-1). These basins occur within portions of 4 of the 10 CDWR-defined hydrologic regions in the State: San Francisco Bay Hydrologic Region (basin designations 2-x on Figure 3.7-1), Central Coast Hydrologic Region (basin designations 3-x on Figure 3.7-1), the San Joaquin River Hydrologic Region (basin designations 5-22.07, 5-22.15, and 5-70; see Figure 3.7-1), and the Tulare Lake Hydrologic Region (basin designations 5-22.09, 5-22.10, 5-23, and 5-71; see Figure 3.7-1). For basins/subbasins in the San Joaquin River and Tulare Lake hydrologic regions (basin designations 5-x), only the western edges of the basins are contained within the CCFO Planning Area (Figure 3.7-1) (CDWR, 2003).

Four Basin Plans developed by the Regional Water Quality Control Boards list beneficial uses for groundwater in the CCFO Planning Area (CRWQCB-CCR, 2011; CRWQCB-CVR, 2011; CRWQCB-CVR, 2004, CRWQCB-SFBR, 2015). These plans designate municipal, agricultural, and/or industrial water supply for most of the groundwater basins/subbasins. Specific beneficial uses for groundwater in the basins/subbasins that contain Federal mineral estate are discussed in Section 3.7.4.

Although groundwater is used throughout the CCFO Planning Area, reliance on groundwater varies significantly from basin to basin. In general, groundwater use is lowest in the northern CCFO Planning Area, especially in the San Francisco Bay region where groundwater provides only about five percent of the total water supply (CDWR, 2003). In contrast, groundwater supplies more than 80 percent of the demand in the southern and central portions of the CCFO Planning Area. Groundwater is also heavily used in areas along the eastern edge of the CCFO Planning Area.

Thousands of public and private wells have been drilled throughout the CCFO Planning Area to support domestic, irrigation, urban, industrial, and other beneficial uses. Information associated with these wells has been confidential historically and not available to the public. With the recent adoption of Senate Bill 83, the public (as of June 2015) can access well completion reports prepared by the well driller (California Water Code Section 13752). Even though the well completion reports are now available, the cur-

rent status of each well is unknown. The timing and amounts of water pumped from any individual well are also unknown (except in the Seaside Groundwater Basin, where water rights have been adjudicated by the courts). Only summary information provided by State agencies such as CDWR is available for documentation of local groundwater use, as summarized in subsequent sections.

California drinking water systems that have completed source water assessments in compliance with the DWSAP program are published by county. For the 12 counties that are either wholly or partially contained within the CCFO Planning Area, approximately 1,721 systems (with 3,643 sources) have completed assessments associated with the DWSAP as listed below:

- Alameda – 21 systems; 79 sources
- Contra Costa County – 119 systems; 166 sources
- San Francisco County – 3 systems; 6 sources
- San Mateo County – 41 systems; 75 sources
- Santa Clara County – 91 systems; 366 sources
- Santa Cruz County – 80 systems; 167 sources
- San Benito County – 56 systems; 79 sources
- Monterey County – 297 systems; 529 sources
- San Joaquin County – 332 systems; 583 sources
- Stanislaus County – 223 systems; 466 sources
- Merced County – 117 systems; 223 sources
- Fresno County – 341 systems; 904 sources

Approximately 59 percent of these systems (and sources) are located in four counties of the adjacent San Joaquin Valley (San Joaquin, Stanislaus, Merced, and Fresno). Only small areas of these counties intersect the CCFO Planning Area, suggesting that the number of drinking water sources and source water assessments in the CCFO Planning Area is closer to about 700 systems and 1,500 sources. Due to security concerns, the actual locations of these sources are not publicly available.

Additional groundwater information is summarized below, organized by three general regions of the CCFO Planning Area (northern, central/southern, and eastern). This discussion is followed by more specific information on groundwater basins/subbasins that contain Federal mineral estate.

Groundwater Basins in the Northern CCFO Planning Area

Groundwater basins in the northern portion of the CCFO Planning Area are in the San Francisco Bay Hydrologic Region (basin designations 2-x on Figure 3.7-1), generally characterized by highly urbanized areas. Aquifers in this area are relatively thin in the smaller basins and moderately thick in the larger and more heavily developed basins such as the Livermore Valley (2-10) or the Santa Clara Valley (2-9.02) (Figure 3.7-1). Well depths range from about 100 feet to 500 feet and well yields range from less than 50 gallons per minute (gpm) to approximately 3,000 gpm. Land subsidence has been a major issue historically in the Santa Clara Valley (2.9-02) but has been mitigated, in part, through monitoring and groundwater management activities (CDWR, 2003).

Groundwater throughout the region is suitable for most urban and agricultural uses with only local impairments. Primary constituents of concern are TDS, nitrate, boron, and organic compounds. Due to the availability of imported surface water supplies, groundwater only supplies approximately five percent of the total water supply demand throughout the hydrologic region. Water quality data from almost 500 public water supply wells indicate that groundwater quality in about 85 percent of the supply wells meets all State primary maximum contaminant levels (MCLs) for drinking water. About 15 percent of the wells have constituents that exceed one or more MCLs (CDWR, 2003).

Groundwater Basins in the Central and Southern CCFO Planning Area

Groundwater basins in the central and southern CCFO Planning Area are located within a portion of the Central Coast Hydrologic Region (designations 3-x on Figure 3.7-1) and include basins/subbasins in Santa Cruz, Santa Clara, San Benito, and Monterey Counties. Aquifer systems range from small inland valleys and coastal terraces to relatively large alluvial valleys (CDWR, 2003).

Groundwater chemistry in the region is characterized by calcium sulfate to calcium-sodium bicarbonate-sulfate water types, related to the marine sedimentary rocks in the region. Seawater intrusion is a major problem in the coastal basins of the region, including basins adjacent to Monterey Bay in the CCFO Planning Area (Figure 3.7-1) (CDWR, 2003). Potential risk of seawater intrusion in one basin along the Monterey Bay was the primary reason for an adjudication of water rights by the courts. This basin, Seaside Groundwater Basin (3-4.08; see Figure 3.7-1), is the only adjudicated basin in the CCFO Planning Area.

The region is heavily reliant on groundwater, providing about 83 percent of the total agricultural and municipal water demand (CDWR, 2003). One basin in the Central Coast Region, Scotts Valley Groundwater Basin (3-27), contains an EPA-designated Sole Source Aquifer (SSA) — the Santa Margarita Aquifer (EPA, 2015b). The SSA Program was established under Section 1424(e) of the Safe Drinking Water Act and identifies aquifers that function as the sole or principal drinking water source of an area with no alternative supplies. The SSA Program has been used by communities to use federally funded projects to assist in protecting an SSA from contamination. The Santa Margarita Aquifer is the only SSA designated in the CCFO Planning Area (EPA, 2015b).

Water quality data collected from about 83 percent of more than 700 public water supply wells indicate that groundwater quality meets State primary MCLs for drinking water. About 17 percent of the wells have constituent concentrations that exceed one or more MCL (CDWR, 2003).

Groundwater Basins along the Eastern CCFO Planning Area Boundary

Groundwater basins along the eastern edge of the CCFO Planning Area include portions of basins and subbasins in the San Joaquin River and Tulare Lake hydrologic regions (basin designations 5-x on Figure 3.7-1). These two hydrologic regions generally cover the San Joaquin Valley, which is the southern portion of the Central Valley of California. Although these regions cover very large groundwater basins, the CCFO Planning Area includes only a few small basins and narrow western segments of the larger San Joaquin Valley basins (Figure 3.7-1). However, these narrow segments are generally hydraulically contiguous with the larger groundwater basins to the east. Aquifers in the San Joaquin Valley basins are relatively thick, extending to depths greater than about 800 feet to 1,000 feet in some areas. Well yields are variable but range up to about 5,000 gpm in the more permeable portions of the San Joaquin Valley. In general, aquifers are thinner and well yields are lower in the portions of the basins within the CCFO Planning Area (CDWR, 2003).

Groundwater typically is of poorer quality along the eastern edge of the CCFO Planning Area due to elevated TDS values and local impacts from nitrates, boron, chloride, and pesticides/herbicides. The basins are heavily reliant on groundwater, accounting for about 30 to 40 percent of the agricultural and municipal water supplies (CDWR, 2003). Most of this groundwater use occurs outside of the CCFO Planning Area.

Groundwater Basins Containing Federal Mineral Estate

Of the 66 groundwater basins and subbasins that partially intersect the CCFO Planning Area, 20 contain Federal mineral estate. These 20 basins/subbasins occur in 7 of the 12 counties in the CCFO Planning Area — Alameda, Contra Costa, Fresno, Merced, Monterey, San Benito, and Santa Cruz. In the remaining five counties — San Francisco, San Joaquin, San Mateo, Santa Clara, and Stanislaus — none of the designated groundwater basins or subbasins contain Federal mineral estate (Figure 3.7-1).

As shown on Figure 3.7-1, most of the Federal mineral estate lands lie outside of a groundwater basin or subbasin. Although groundwater also occurs beneath lands outside of groundwater basin or subbasin boundaries, in general groundwater resources are more limited, less used, and not actively managed in these areas. In addition, less information may be available on the quality and quantity of groundwater outside of groundwater basin boundaries.

Table 3.7-2 presents summary information on the 20 groundwater basins and subbasins that contain Federal mineral estate within the CCFO Planning Area. The table identifies the basin and subbasin (if applicable), along with the CDWR-designated basin number included on Figure 3.7-1. Also included is the CCFO Planning Area county in which most of the basin/subbasin resides. Oil and gas fields that intersect a portion of the basin/subbasin are identified by field numbers (see Table 3.7-1 for oil and gas field numbers and names). Table 3.7-2 also includes an estimate of how much groundwater is used in each basin/subbasin (CDWR, 2014a), an amount that varies widely with the size of the basin, local population, and availability of surface water supplies, among other factors. Some of the small, isolated subbasins in the southeastern study area are essentially un-used groundwater basins (e.g., Vallecitos Creek Valley), while one subbasin in the adjacent San Joaquin Valley (e.g., Delta Mendota subbasin) provides more than 500,000 acre-feet per year (AFY) for groundwater supply. However, as shown on Figure 3.7-1, the two high-use subbasins of the San Joaquin Valley are located mostly outside of the CCFO Planning Area; only small segments along the western boundaries occur in the CCFO Planning Area (see subbasin numbers 5-22.07 and 5-22.09 on Figure 3.7-1). For the basins/subbasins contained mostly within the CCFO Planning Area, three subbasins in the Salinas Valley of Monterey County represent the most groundwater use. As shown on Table 3.7-2, each of these three subbasins provide a groundwater supply of more than 100,000 AFY.

Table 3.7-2. Groundwater Basins in the CCFO Planning Area with Federal Mineral Estate

CDWR Groundwater Basin / Subbasin			County[1]	Oil & Gas Field(s) in Basin?		Groundwater Usage (AFY)	CDWR Priority Ranking[2]
Basin Name	Subbasin Name	Number		Y/N	Field No.		
Santa Clara Valley	Niles Cone	2-9.01	Alameda	N	—	29,600	medium
Clayton Valley	—	2-5	Contra Costa	Y	9, 19	189	very low
San Joaquin Valley	Tracy	5-22.15		Y	7	19,198	medium
	Delta-Mendota*	5-22.07	Fresno / Merced	N	—	509,687	high*
	Pleasant Valley	5-22.10	Fresno	Y	20, 21, 22, 23, 24, 26	47,383	low
	Westside*	5-22.09		Y	20, 21, 22, 24, 26	411,534	high*
Cholame Valley	—	3-5	Monterey	N	—	5,011	very low
Lockwood Valley	—	3-6		N	—	4,565	very low
Peach Tree Valley	—	3-32		N	—	902	very low
Salinas Valley	Forebay Aquifer	3-4.04		Y	30	160,000	medium
	Upper Valley Aquifer	3-4.05		Y	30, 33	125,000	medium
	Paso Robles Area*	3-4.06		Y	33	120,215	high*

Table 3.7-2. Groundwater Basins in the CCFO Planning Area with Federal Mineral Estate

CDWR Groundwater Basin / Subbasin			County[1]	Oil & Gas Field(s) in Basin?		Groundwater Usage (AFY)	CDWR Priority Ranking[2]
Basin Name	Subbasin Name	Number		Y/N	Field No.		
Bitterwater Valley	—	3-30	San Benito	N	—	3,023	very low
San Benito River Valley	—	3-28		N	—	946	very low
Gilroy–Hollister Valley	San Juan Bautista Area	3-3.04		N	—	13,530	medium
Hernandez Valley	—	3-31		N	—	0	very low
Panoche Valley	—	5-23		N	—	200	very low
Vallecitos Creek Valley	—	5-71		Y	36	0	very low
Santa Cruz Purisima Formation	—	3-21	Santa Cruz	N	—	15,000	medium
Pajaro Valley*	—	3-2		N	—	67,000	high*

1 - No groundwater basins with Federal mineral estate in San Francisco, San Joaquin, San Mateo, Santa Clara, or Stanislaus Counties.
2 - As part of the CASGEM basin prioritization process.
*Included on the CDWR Draft List of Critically Overdrafted Groundwater Basins, August 6, 2015 (CDWR, 2015b).

In part, because of this relatively low reliance on groundwater, one-half of the 20 basins/subbasins with Federal mineral estate have been assigned a low- to very low-priority ranking by CDWR (Table 3.7-2). The remaining 10 basins/subbasins with Federal mineral estate are assigned a medium to high-priority ranking, which triggers certain groundwater management planning requirements under SGMA. The high-priority groundwater basins/subbasins in Table 3.7-2 have also been included on the recently published Draft List of Critically Overdrafted Groundwater Basins (CDWR, 2015b). However, two of the high-priority basins/subbasins (Delta-Mendota and Westside) and one of the medium-priority basins (Tracy) are located mostly outside of the CCFO Planning Area.

Additional local details on the groundwater basins/subbasins with Federal mineral estate, along with information on current conditions and trends, are provided in the following section.

3.7.4 Current Conditions and Trends

Since 2012, lower-than-normal precipitation has created drought conditions across California. As of August 2015, the National Drought Mitigation Center has categorized more than 95 percent of the State as being under a severe drought and most of the State, including the CCFO Planning Area, categorized being in an extreme or exceptional drought (NDMC, 2015). The snowpack in the Sierra Nevada, which provides storage and runoff for the State's water supply during the dry season, was measured at five percent of average in April 2015, the lowest snowpack in 75 years (Pacific Institute, 2015). Water year 2014 was the driest in 119 years of records and the warmest year on record. These conditions have contributed to reduced streamflows, fallowed agricultural land, a drop in hydroelectric power generation, ecosystem stress or damage, rising water prices, mandatory water conservation programs, and a significant increase in groundwater pumping.

The scarcity of surface water sources has increased reliance on groundwater, and water levels have declined significantly in many areas including portions of the CCFO Planning Area. According to a CDWR map of changes in water levels, water level declines of up to about 25 feet from 2011 to 2013 were typical in wells located in the CCFO Planning Area (CDWR, 2013b). Water level data were limited in the southern CCFO Planning Area, but some of the largest declines in the State were measured several miles east of the southern CCFO Planning Area in the groundwater basins of the San Joaquin Valley. In

some areas of the valley, water levels have declined more than 130 feet during the last four years (USGS, 2015). The increased use of groundwater has also contributed to overdraft conditions, groundwater quality degradation, and land subsidence in local areas throughout the State. A recent study published by NASA indicates that groundwater pumping in the Central Valley has caused land subsidence of over 13 inches from May 2014 to January 2015 in Corcoran, located east of the CCFO Planning Area in Kings County (NASA, 2015).

The current California drought is likely exacerbated by climate change (Williams et al., 2015) and, as a result of climate change, there is a greater than average probability that drought will become more common place for California. Long-term drought not only increases reliability upon groundwater but also can significantly decrease the amount of recharge aquifers receive, which can increase aquifer stress and overdraft. Warmer temperatures resulting from climate change can also mean that precipitation which historically fell as snow will fall as rain in the future resulting in more runoff and less aquifer recharge. As described previously, groundwater basins and subbasins have recently been prioritized as high-, medium-, or low-priority by CDWR as part of the State-wide CASGEM program (see previous descriptions of the CASGEM Program in Sections 3.7.1 and 3.7.2) (CDWR, 2014a). The CASGEM priority rankings for basins with Federal mineral estate are summarized in Table 3.7-2 above. As discussed previously, one criterion of the CASGEM ranking relates to local groundwater impacts including overdraft conditions, seawater intrusion, and other factors relating to groundwater quality degradation. On August 6, 2015, CDWR published a draft list of the State's 21 most critically overdrafted groundwater basins (CDWR, 2015b). Six of those basins are in the CCFO Planning Area and four contain Federal mineral estate. Following a public comment period, these basins may be permanently added to the State list, triggering additional groundwater management actions under SGMA. The six basins on the Draft List of Critically Overdrafted Basins, including the four with Federal mineral estate, are listed below (CDWR, 2015b) and shown on Figures 3.7-2 and 3.7-3.

- Soquel Valley (3-1), Santa Cruz County
- Pajaro Valley (3-2), Santa Cruz and Monterey Counties (contains Federal mineral estate)
- 180/400 Foot Aquifer (3-4.01), Monterey County
- Paso Robles Area (3-4.6), Monterey County (and San Luis Obispo County outside of the CCFO Planning Area) (contains Federal mineral estate)
- Delta-Mendota (5-22.07), Stanislaus, Merced, and Fresno Counties (contains Federal mineral estate)
- Westside (5-22.09), Fresno County (contains Federal mineral estate)

Figures 3.7-2 (northern CCFO Planning Area) and 3.7-3 (southern CCFO Planning Area) show the same groundwater basin/subbasins boundaries as on Figure 3.7-1, but each basin/subbasin is color-coded to represent its respective CASGEM ranking. High-priority and medium-priority basins/subbasins are highlighted in orange and yellow, respectively (Figures 3.7-2 and 3.7-3). The six high-priority basins that are also on the Draft List of Critically Overdrafted Basins are highlighted with orange stripes.

In addition to requirements associated with SGMA and the CASGEM basin prioritization, four counties that are partially or wholly contained within the CCFO Planning Area have adopted groundwater ordinances (CDWR, 2003). These ordinances address local issues relating to groundwater quality or overdraft and often require a permitting process if pumped groundwater is to be exported for use outside of the groundwater basin from which it was pumped. The four ordinances that apply to the CCFO Planning Area are summarized below:

- San Joaquin County – Export permit required
- San Benito County – Overdraft pumping for export prohibited; permit required for off-parcel use or injecting imported water; restrictions on certain pumping impacts on other wells
- Monterey County – Water Resources Agency regulates extraction in areas of seawater intrusion
- Fresno County – Export permit required

This discussion on general groundwater conditions in the CCFO Planning Area focuses on the 20 groundwater basins and subbasins containing Federal mineral estate. The description of each groundwater basin provides basic information on the location, size and geologic setting of the basin and the occurrence of groundwater. Data on groundwater storage, groundwater pumping, and groundwater quality are informative about the magnitude of the resource, its general quality, and its use. This information supports consideration of the importance of a groundwater basin on a statewide basis, recognizing that small, lightly developed, or poor quality basins may have great local significance. Much information was compiled from CDWR's Bulletin 118 Update, California's Groundwater (CDWR, 2003). It is recognized that many basins are carefully managed and monitored, and that substantial additional information is available from local water agencies, which will be considered at the APD stage. However, Bulletin 118 and recent CASGEM data provide consistent, comparable information for all groundwater basins/subbasins in the CCFO Planning Area.

The information presented on Figure 3.7-1 has been repeated at different scales on Figures 3.7-2 (northern area) and 3.7-3 (southern area) to better identify key features regarding boundaries of BLM parcels, oil and gas fields, and groundwater basins/subbasins.

The 13 oil and gas fields that contain Federal mineral estate (shown in bold on Table 3.7-1) are located throughout the CCFO Planning Area, but most of these fields occur in the southern area (Figure 3.7-3). As previously noted, the southern area also contains the largest portion of Federal mineral estate, including the location of the leases subject to the settlement agreement. The three fields with Federal mineral estate in the northern area consist of gas fields (one abandoned) in Contra Costa County (Table 3.7-1 and Figure 3.7-2). Most of the remaining oil and gas fields with Federal mineral estate occur in the southern area along the western flank of the San Joaquin Valley (western Fresno County), along the southern Salinas Valley of Monterey County, or throughout the hills of the Coast Ranges in southern San Benito County. Regional cross sections of these three geologic settings have been prepared by DOGGR and are reproduced, in part, on Figure 3.7-4. The locations of the cross sections are shown on Figure 3.7-3. Although these cross sections are relatively old, they adequately represent the subsurface depths and conditions for the purposes of this groundwater analysis. Specific oil and gas fields represented on the cross sections include the Vallecitos field in San Benito County, the San Ardo field in Monterey County, and the Coalinga field (including East Side, West Side, and the East Coalinga Extension fields) in western Fresno County (Figure 3.7-4).

Recent oil and gas development has been concentrated in four existing fields in the CCFO Planning Area: Coalinga and Jacalitos fields in western Fresno County and San Ardo and Lynch Canyon fields in Monterey County (Figures 3.7-3 and 3.7-4). Federal mineral estate occurs in each of these fields except for the Lynch Canyon field. In addition, a portion of each of these fields occurs in a groundwater basin (Table 3.7-1 and Figure 3.7-3). Based on DOGGR's well stimulation disclosures, there were 903 well stimulation treatments, including hydraulic fracturing, completed in California between January 2, 2014 and June 22, 2015. These well stimulation treatments were conducted in 12 oil and gas fields in California, none of which are within the CCFO Planning Area. Therefore, the source and volume of water needed for potential future hydraulic fracturing in these four fields is uncertain. However, since each of these four fields is located, at least in part, within a groundwater basin, there is the potential that groundwater will be used to support oil and gas operations including hydraulic fracturing. As discussed more fully in Section 4.7.2, the average amount of water required for hydraulic fracturing in California is approximately 140,000 gallons per well, an amount equivalent to 0.4 AF (CCST, 2015a). For context, this amount is similar to the average annual household water use of 153,000 gallons (CCST, 2015a). In addition, the amount is small compared to the amount of groundwater being used in most groundwater basins (Table 3.7-2). However, two of the fields which include Federal mineral estate are within portions of critically overdrafted basins: the Coalinga field is within a portion of the Westside subbasin (5-22.09) and the San Ardo field is within a portion of the Paso Robles Area subbasin (3-4.06).

As described more fully in Section 4.7.2, CCST compiled water use data for 1,760 hydraulic fracturing events conducted in California from 2011 through June 2014 (CCST, 2015a). During this time, there was only one hydraulic fracturing event in the CCFO Planning Area, located in the Guijarral Hills field in Fresno County. This hydraulic fracturing event used 2,123,268 gallons (6.5 AF) of water (CCST, 2015a, Appendix O), which is significantly above the average per well water use (0.4 AF). The Guijarral Hills field contains Federal mineral estate and is within a portion of the Westside subbasin (5-22.09), a critically overdrafted basin (CDWR, 2015b).

For groundwater basins/subbasins that intersect portions of the 13 oil and gas fields on Federal mineral estate, additional information has been compiled to examine the subsurface relationships between usable groundwater and hydrocarbon-bearing zones. It is noted that the depth of the usable groundwater zones has not been identified over most of the CCFO Planning Area. To address this data gap near existing oil and gas fields, relevant available information has been examined. The depth to the base of fresh groundwater at each oil and gas field has been tabulated based on data published by DOGGR. The depths to the productive hydrocarbon zones have been compiled, with an emphasis on the shallow-most producing zone — assumed to be the zone closest to usable groundwater. In addition, available salinity data for water produced from the hydrocarbon zones (referred to as produced water) have been evaluated. Although hydrocarbon zones are exempt from the definition of usable groundwater, lower salinity values in produced water may indicate that usable groundwater (<10,000 mg/L TDS) is in close vertical proximity to the hydrocarbon zones. These data sets are pertinent to the analysis of potential impacts to usable groundwater from oil and gas production and hydraulic fracturing. This assertion is based on the simple supposition that less vertical separation between usable groundwater and hydrocarbon-bearing zones can suggest a greater potential for adverse impacts; conversely, greater separation may indicate a lesser potential for adverse impacts. This assumption and the accompanying impacts analysis are discussed in more detail in Section 4.7.

As discussed in Section 3.7.2, Regulatory Framework, aquifers can be designated by EPA and DOGGR as exempt as part of the UIC program to allow injection of wastewater into aquifers. By definition, exempt aquifers do not contain usable water. Exempt aquifers typically underlie the freshwater zone, overlie hydrocarbon zones, and usually do not extend laterally beyond the oil and gas field. There are some cases where exempt aquifers extend to the surface.

As summarized below in Table 3.7-3, there are nine exempt aquifers associated with six oil and gas fields within the CCFO Planning Area. Two of the oil and gas fields, Coalinga and San Ardo, contain more than one exempt aquifer. The tops of the exempt aquifers are relatively shallow in the CCFO Planning Area (1,400 feet deep or less) and extend to the surface within portions of the Coalinga fields. The cross sections on Figure 3.7-4 illustrate the vertical extent of the exempt aquifers within the San Ardo and Coalinga fields. Exempt aquifers are exempted from usable water by definition in the BLM final rule (43 CFR Part 3160).

Table 3.7-3. Exempt Aquifers in the CCFO Planning Area

Oil and Gas Field	Exempt Aquifer Formation Name (Geologic Age)	Depth to Top of Exempt Aquifer (feet below ground surface)
Coalinga	Santa Margarita (Miocene)	surface (to 1,500 feet)
Coalinga	Etchegoin-Jacalitos Undifferentiated (Pliocene)	surface (to 500 feet)
Guijarral Hills	Etchegoin-Jacalitos Undifferentiated (Pliocene)	1,400
Kettleman North Dome	San Joaquin–Etchegoin (Pliocene)	1,000
Jacalitos	Etchegoin-Jacalitos Undifferentiated (Pliocene)	<1,000
San Ardo	Santa Margarita (Miocene)	900
San Ardo	Monterey (Miocene) D Sand	1,200
San Ardo	Monterey (Miocene) E Sand	1,300
Monroe Swell	Santa Margarita (Miocene)	800

Descriptions of Groundwater Basins with Federal Mineral Estate

There are 20 groundwater basins overlain by Federal mineral estate in the CCFO Planning Area. To facilitate the discussion of groundwater in these basins/subbasins, the information is organized by County. Where basins/subbasins cross county lines, the information is included in the county where most of the basin/subbasin resides. For any of these 20 basins/subbasins that also contain at least a portion of an oil and gas field, data from those fields are also discussed. Data for the 20 basins/subbasins are summarized in Table 3.7-2. Information on the 13 oil and gas fields with Federal mineral estate is included in Table 3.7-4, which includes data used to examine the subsurface relationships between usable groundwater and hydrocarbon zones beneath Federal mineral estate, where data exist for both zones. Data from Table 3.7-4 are discussed with the groundwater basin/subbasin in which they occur. Exempt aquifers for the 13 oil and gas fields, if any, are also mentioned.

Alameda County

Santa Clara Valley, Niles Cone Subbasin (2.9-01). The Niles Cone groundwater subbasin is in southern Alameda County and has a surface area of 103 square miles (Figure 3-7.2). The subbasin is bounded by Alameda County Water District boundaries on the north, the Santa Clara County border on the south, the Diablo Range on the east, and the San Francisco Bay on the west. The subbasin is dominated by an alluvial fan that was formed by Alameda Creek as it flowed toward the San Francisco Bay. The Hayward Fault impedes the flow of groundwater from west to east and separates the subbasin into two parts. The east side of the Hayward Fault is composed of one relatively homogeneous sand and gravel aquifer while the west side of the Hayward Fault is composed of a series of gently dipping aquifers separated by extensive clay aquitards. Artificial recharge projects on the west side of the Hayward Fault since the 1960s have resulted in significant groundwater level recovery. Municipal/irrigation wells are, on average, approximately 2,000 feet deep and yield between approximately 650 and 3,000 gpm. Groundwater in storage in 1999-2000 was estimated to be 38,000 AF (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Niles Cone subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-SFBR, 2015). CDWR estimates groundwater use in the basin at 29,600 AFY and has assigned a medium-priority ranking to the subbasin as part of the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a). TDS concentrations range from 286 to 39,734 mg/L and averages 2,204 mg/L. TDS concentrations are highest along San Francisco Bay (CDWR, 2003).

The Niles Cone Subbasin does not contain any oil and gas fields with Federal mineral estate.

Contra Costa County

As shown on Figure 3.7-2 and Table 3.7-2, the groundwater basins on Federal mineral estate in Contra Costa County include the Clayton Valley groundwater basin and the Tracy subbasin.

Clayton Valley (2-5). The Clayton Valley basin is in northern Contra Costa County along the south side of Suisun Bay and has a surface area of 28 square miles (Figure 3.7-2). The basin is bounded by Mt. Diablo Creek on the east, the Concord Fault to the west, and the Mt. Diablo foothills to the south. The Pittsburg Plain basin (2-4) lies to the northeast, and the Ygnacio Valley basin (2-6) borders the basin on the southwest. Water bearing units consist of Recent and older alluvium with a combined thickness of

Table 3.7-4. Relationship Between Fresh Water and Hydrocarbon Zones in the CCFO Planning Area for Fields with Federal Mineral Estate

County[1]	Oil and Gas Field Name	Oil and Gas Field Number	Depth to Base of Fresh Water[2] (feet)	Depth to Hydrocarbon Zone (feet)		Difference Between Base of Fresh Water and Top of Hydrocarbon Zone (feet)	Water Salinity of Hydrocarbon Zone		TDS <10,000 mg/L? (Y/N)
				Upper	Lower		NaCl (mg/L)	TDS (mg/L)	
Contra Costa	Dutch Slough Gas	7	800	7,000	8,100	6,200	325–4,622	—	Y
	Los Medanos Gas	9	150-1,000	2,800	4,300	1,800–2,650	10,800	—	N
	Willow Pass Gas (abandoned)	19	150	1,500	3,100	1,350	—	—	
Fresno	Coalinga	20	2,100	500	700	500	1,600	5,700–6,800	Y
	Coalinga, East Extension	21	2,100	6,400	8,000	4,300	500	2,600	Y
	Guijarral Hills	22	2,000-3,250	7,900	10,700	4,650–5,900	2,400–7,870	4,500–9,300	Y
	Jacalitos	23	550	3,400	—	2,850	8,700–9,900	9,400–11,800	Y
	Kettleman North Dome	24	—	6,000	11,700	—	7,100–33,000	8,900–33,900	Y
	Pleasant Valley	26	2,300	6,644	9,144	4,344	11,300	15,700	N
Monterey	Monroe Swell	30	1,300-2,000	2,000	3,200	700–1,900	3,500	4,800–5,300	Y
	Quinado Canyon (abandoned)	32	1,800	2,030	—	230	4,200	—	Y
	San Ardo	33	1,000	2,000	2,400	1,000	1,700–6,000	4,300	Y
San Benito	Vallecitos	36	100-500	1,040	5,350	540–940	1,100–3,600	8,100–8,200	Y

1 - No oil and gas fields within Federal mineral estate in Alameda, San Mateo, Santa Clara Counties.
2 - Range provided, where available.

over 700 feet. Aquifers are hydrologically connected to Suisun Bay. The older alluvial deposits are at the surface in the southern portion of the basin and provide the primary groundwater supply. The younger alluvial deposits consist of soft muds, peat, and loose sand located along the Suisun Bay (CDWR, 2003).

The Basin Plan lists municipal and domestic supply as beneficial uses for groundwater in the Clayton Valley basin (CRWQCB-SFBR, 2015). CDWR estimates groundwater use in the basin at 189 AFY and has assigned the basin with a very low-priority ranking (Table 3.7-2) (CDWR, 2014a). TDS concentrations range from 328 to 864 mg/L and average 472 mg/L. Municipal and irrigation well yields average 200 gpm and are drilled to depths of 80 to 540 feet (average 209 feet). Domestic well depths range from 40 to 605 feet (average 217 feet) (CDWR, 2003).

The Clayton Valley groundwater basin intersects two oil and gas fields that contain Federal mineral estate — Los Medanos Gas and Willow Pass Gas (abandoned). As summarized on Table 3.7-4, the depth to the base of fresh water within these oil and gas fields ranges from 150 to 1,000 feet. The depth to the shallowest hydrocarbon zone ranges from about 1,500 to 2,800 feet. In the hydrocarbon zone, sodium chloride concentrations are 10,800 mg/L. The vertical separation between the base of fresh water and the top of the hydrocarbon zone ranges from 1,350 to 2,650 feet. Based on reported depths and salinity in the fields, the base of usable groundwater likely occurs within this zone (see Appendix J in DOC, 2015; DOC, 1998).

San Joaquin Valley, Tracy Subbasin (5-22.15). The Tracy subbasin has a surface area of 539 square miles (Figure 3.7-2). The subbasin is also in San Joaquin and Contra Costa Counties. The Mokelumne and San Joaquin rivers lie to the north, the San Joaquin River is to the east, the Diablo Range lies to the west, and the San Joaquin–Stanislaus County line is to the south. The Eastern San Joaquin subbasin (5-22.01) lies to the east, the Delta-Mendota subbasin (5-22.07) lies to south, and the Solano (5-21.66) subbasin of the Sacramento Valley groundwater basin lies to the north (CDWR, 2003).

Water bearing units consist of younger alluvium, flood basin, older alluvium, and Tulare Formation deposits. The alluvium is less than 100 feet thick and has high well yields if saturated. The flood basin deposits can be up to 1,400 feet thick, occur in the northern two-thirds of the subbasin, and have low well yields. The older alluvial fan deposits are 150 feet thick, occur at the surface between the foothills of the Coast Ranges and the Sacramento–San Joaquin Delta, and have moderate to high permeability. The Tulare Formation is about 1,400 feet thick, crops out in the Coast Range foothills in the western portion of the subbasin, and dips eastward toward the valley axis. The Corcoran Clay is found at the top of the Tulare Formation and confines the underlying deposits. The eastern limit of the Corcoran Clay is near the eastern boundary of the basin. Larger wells are screened below the Corcoran Clay and can yield 3,000 gpm while smaller wells may be screened above the clay layer but water quality is generally poorer. The storage capacity for the Tracy-Patterson Storage Unit (which includes the southern portion of the Tracy subbasin) was estimated to be 4,040,000 AF (CDWR, 2003).

The Basin Plan lists groundwater beneficial uses in the Tracy subbasin as municipal, domestic, agricultural, and industrial service supply (CRWQCB-CVR, 2011). CDWR estimates groundwater use in the subbasin at 19,198 AFY and has assigned a medium CASGEM groundwater priority ranking to the subbasin (Table 3.7-2) (CDWR, 2014a). TDS concentrations range from 210 to 7,800 mg/L and average 1,190 mg/L. Municipal and irrigation wells are drilled to depths of 60 to 1,020 feet (average 352 feet) and yields are generally between 500 and 3,000 gpm. Domestic well depths range from 44 to 665 feet (average 188 feet) (CDWR, 2003).

The Tracy subbasin contains one oil and gas field on Federal mineral estate — Dutch Slough Gas. As summarized on Table 3.7-4, the depth to the base of fresh water within this oil and gas field is estimated at 800 feet. The depth to the hydrocarbon zone is 7,000 feet. The vertical separation between the base of fresh water and the top of the hydrocarbon zone is estimated at 6,200 feet thick. In the hydrocarbon zone, sodium chloride concentrations of produced water range from 325 to 4,622 mg/L. Although these con-

centrations would be expected to be lower than TDS concentrations, the values indicate relatively low salinities and may also indicate a deep zone of usable groundwater in this area (see Appendix J in DOC, 2015; DOC, 1998).

Fresno County

As shown on Figure 3.7-3, three subbasins of the San Joaquin Valley are the primary groundwater basins/ subbasins for the Fresno County portion of the CCFO Planning Area. As shown on the map, only a small portion of the Delta Mendota (5-22.07) and Westside (5-22.09) subbasins are contained within the CCFO Planning Area, but the entire northern half of the Pleasant Valley subbasin (5-22.10) is included. (Note that Pleasant Valley is the name of both a groundwater subbasin and an oil and gas field). A small portion of the Panoche Valley groundwater basin (5-23) is also located in Fresno County, but because it lies primarily within San Benito County, it is described below with other San Benito County basins/subbasins.

San Joaquin Valley, Delta-Mendota Subbasin (5-22.07). The Delta-Mendota groundwater subbasin covers 1,170 square miles in Stanislaus, Merced, Madera, and Fresno Counties (Figure 3.7-3). The subbasin is bounded on the west by the Coast Ranges, on the north by the Stanislaus/San Joaquin County line and the Tracy subbasin (5-22.15), on the south by the Fresno County line and the Westside subbasin (5-22.09), and on the east by the San Joaquin River and the Modesto (5-22.02), Turlock (5-22.03), Merced (5-22.04), Chowchilla (5-22.05), and Madera (5-22.06) subbasins. Only a narrow segment along the subbasin western boundary is included in the CCFO Planning Area (CDWR, 2003).

Historically, groundwater flow has been to the northwest, parallel to the San Joaquin River. Data published by CDWR in 2000 indicate that groundwater flows to the north and east, toward the San Joaquin River. Groundwater is present in the lower and upper zones of the Tulare Formation and the overlying shallow deposits where depth to water is approximately 25 feet. Thicknesses of these units are not available. Municipal/irrigation well depths are up to 800 feet and yield up to 5,000 gpm. Based on estimates completed in 1995, the total storage capacity is 30.4 million AF in the upper 300 feet and is 81.8 million AF to the base of fresh water (depth not available). In 1995, the estimated volume of groundwater in storage in the upper 300 feet was estimated to be 26.6 million AF (CDWR, 2003).

The Basin Plan lists beneficial uses for the Delta-Mendota subbasin as municipal, domestic, agricultural, and industrial supply, non-contact recreation, and wildlife habitat (CRWQCB-CVR, 2011). CDWR estimates groundwater use in the subbasin at 509,687 AFY (CDWR, 2014a). The subbasin has been assigned a high-priority ranking for the CASGEM basin prioritization program (CDWR, 2014a) and has also been placed on the Draft List of Critically Overdrafted Groundwater Basins (Table 3.7-2) (CDWR, 2015b). TDS concentrations range from approximately 200 to 6,000 mg/L, and are typically between 700 and 1,000 mg/L. Saline groundwater occurs within the upper 10 feet of ground surface in a large portion of the subbasin (CDWR, 2003).

The Delta-Mendota subbasin does not contain any oil and gas fields with Federal mineral estate.

San Joaquin Valley, Pleasant Valley Subbasin (5-22.10). The Pleasant Valley groundwater subbasin covers 227 square miles in southern Fresno County and western Kings County (Figure 3.7-3). The subbasin is bounded on the north and west by the Coast Ranges, on the east by the Kettleman Hills and the Westside and Tulare Lake subbasins, and on the south by the Kern County subbasin. The water bearing units include the alluvium and Tulare Formation, both of which are up to 300 feet thick. These units are underlain by the San Joaquin Formation. The Pleasant Valley Subbasin is shown conceptually on the lower cross section on Figure 3.7-4. Municipal/irrigation wells are up to approximately 1,800 feet deep and yield up to 3,300 gpm. The total storage capacity is estimated to be 14.1 million AF and the estimated groundwater in storage to a depth of 1,000 was estimated in 1961 to be 4 million AF (CDWR, 2003).

The Basin Plan lists beneficial uses for the Pleasant Valley subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CVR, 2004). CDWR estimates groundwater use in the subbasin at

47,383 AFY and has assigned the subbasin a low-priority ranking in the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a). TDS concentrations range from approximately 1,000 to 3,000 mg/L (CDWR, 2003).

The Pleasant Valley subbasin contains six active oil and gas fields with Federal mineral estate — Coalinga, Coalinga East Extension, Guijarral Hills, Jacalitos, Kettleman North Dome, and Pleasant Valley (note that Pleasant Valley is the name of both a groundwater subbasin and an oil and gas field). The geologic setting for these fields on the western flank of the San Joaquin Valley is illustrated by the regional cross section at the bottom of Figure 3.7-4. As summarized in Table 3.7-4, the depth to the base of fresh water ranges from ground surface to 3,250 feet across these fields. The depth to the top of the hydrocarbon zone ranges from about 500 feet (above portions of the subbasin) to about 7,900 feet. In the hydrocarbon zone, sodium chloride concentrations range from 500 to 33,000 mg/L and TDS ranges from 2,600 to 33,900 mg/L. The vertical separation between the base of the fresh water and the top of the hydrocarbon zone ranges from about 500 to 5,900 feet. The wide range in TDS values, depths, and separation between fresh water and hydrocarbons reflects the variable locations of the fields with respect to the groundwater basin (see Figure 3.7-4). Available data corroborate the relatively high TDS values in groundwater reported in the basin and the dip of the hydrocarbon zones from east to west (see Appendix J in DOC, 2015; DOC, 1998).

Although the Coalinga, Guijarral Hills, Jacalitos, and Kettleman North Dome oil and gas fields contain exempt aquifers, none of the exemptions appear to apply to the water-bearing zones in the alluvium or the Tulare Formation (see Table 3.7-3). The underlying San Joaquin Formation is included in the exempt aquifers and may reflect an absence of usable water in the deeper Pleasant Valley subbasin zones.

San Joaquin Valley, Westside Subbasin (5-22.09). The Westside subbasin covers 1,000 square miles in western Fresno County and western Kings County (Figure 3.7-3). The subbasin is bounded on the north by the Delta-Mendota subbasin, on the east by the San Joaquin River, Fresno Slough, and the Kings subbasin, on the southeast by the Tulare Lake subbasin, on the southwest by the Pleasant Valley subbasin, and on the west by the Coast Range foothills. Similar to the Delta-Mendota subbasin, only a narrow segment along the west side of the subbasin is contained within the CCFO Planning Area (CDWR, 2003).

The water bearing units include continental deposits that form an unconfined to semi-confined upper aquifer above the Corcoran Clay aquitard and a confined lower aquifer below the Corcoran Clay. The top of the Corcoran Clay is at a depth ranging from 500 to 850 feet and the lower aquifer is approximately 1,200 feet thick from the average base of the Corcoran Clay to the average base of fresh water. Municipal/irrigation well depths are up to 3,000 feet deep and yield up to 2,000 gpm. The storage capacity of the upper and lower aquifers were estimated to be approximately 36.5 and 65 million AF, respectively. In 1961, the volume of groundwater in storage to a depth of 1,000 feet was estimated to be approximately 52 million AF (CDWR, 2003).

The Basin Plan lists beneficial uses for the Westside subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CVR, 2004). CDWR estimates groundwater use in the subbasin at 411,534 AFY (CDWR, 2014a). The subbasin has been assigned a high-priority ranking for the CASGEM program (CDWR, 2014a) and has also been placed on the Draft List of Critically Overdrafted Groundwater Basins (Table 3.7-2) (CDWR, 2015b). TDS concentrations typically range from approximately 220 to 1,300 mg/L, but can exceed 10,000 mg/L in some places (CDWR, 2003).

The Westside subbasin contains portions of five active oil and gas fields on Federal mineral estate — Coalinga, Coalinga East Extension, Guijarral Hills, Kettleman North Dome, and Pleasant Valley. These fields and the subsurface relationships of groundwater and hydrocarbons beneath them are included in the previous description of the Pleasant Valley subbasin (5-22.10). Exempt aquifers beneath these fields are summarized in Table 3.7-3. The presence of exempt aquifers beneath these fields makes the zone of usable water less certain.

Merced County

As shown on Figures 3.7-2 and 3.7-3, the San Joaquin Valley, Delta-Mendota subbasin is the only groundwater basin with Federal mineral estate in the CCFO Planning Area portion of Merced County. The Delta-Mendota subbasin is also located in Fresno County and is described above.

Monterey County

Cholame Valley (3-5). Cholame Valley groundwater basin has a surface area of approximately 62 square miles and is located in the Coast Ranges of southern Monterey County and northern San Luis Obispo County (Figure 3.7-3). Groundwater flow direction is to the southeast. Based on CDWR's review of 18 well completion logs in the basin, wells are from 100 to 665 feet deep and penetrate both alluvial and consolidated rocks. Most of the well completion reports are for domestic wells. Wells in the basin yield an average of 1,000 gpm, but can yield up to 3,000 gpm (CDWR, 2003).

The Basin Plan lists beneficial uses for the Cholame Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the basin at 5,011 AFY and has assigned the basin a very low-priority ranking under the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The basin does not intersect any existing oil and gas fields with Federal mineral estate.

Lockwood Valley (3-6). Lockwood Valley groundwater basin has a surface area of approximately 94 square miles and is located in the Coast Ranges west of Salinas Valley in southern Monterey County (Figure 3.7-3). Groundwater is present in the unconsolidated alluvium along the San Antonio River and in the terrace deposits. Domestic wells are up to 30 feet deep, while municipal/irrigation wells are up to 1,000 feet deep and yield an average of 100 gpm. Based on well completion reports, the depth to water ranges from approximately 10 to 150 feet. The groundwater storage capacity is approximately 1 million AF (CDWR, 2003).

The Basin Plan lists beneficial uses for the Lockwood Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the basin at 4,565 AFY and has assigned the basin a very low-priority ranking in the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The basin does not contain any existing oil and gas fields with Federal mineral estate.

Peach Tree Valley (3-32). The Peach Tree Valley groundwater basin is a narrow northwest-southeast trending basin approximately 21 miles long and less than 1 mile wide mostly within Monterey County (Figure 3.7-3). The basin is composed primarily of Quaternary alluvium with well depths ranging from 60 to 117 feet, based on four well completion reports. Based on well completion reports for wells drilled between 1953 and 1997, groundwater levels ranged from 35 to 65 feet (CDWR, 2003).

The Basin Plan lists beneficial uses for the Peach Tree Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the basin at 902 AFY and has assigned the basin a very low-priority ranking in the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The Peach Tree Valley basin does not contain oil and gas fields with Federal mineral estate.

Salinas Valley, Forebay Aquifer Subbasin (3-4.04). The Salinas Valley groundwater basin contains eight subbasins, three of which contain Federal mineral estate including the Forebay Aquifer (3-4.04), Upper Valley Aquifer (3-4.05), and Paso Robles Area (3-4.06) subbasins (Figure 3.7-3). The Forebay Aquifer subbasin covers approximately 147 square miles in the central portion of the Salinas Valley. The subbasin is located between the 180/400 Foot Aquifer and Eastside Aquifer subbasins to the north, the

Upper Aquifer subbasin to the south, and surrounded by the Gabilan Range on the east and the Sierra de Salinas on the west. The Forebay Aquifer subbasin was once split into the Upper Forebay area (formerly basin number 3-4.04) and the Lower Forebay area (formerly basin number 3-4.03), but has been combined into one subbasin (CDWR, 2003).

Groundwater flow direction is to the northwest, along the axis of the valley. The primary water bearing units are the 180-Foot Aquifer and the 400-Foot Aquifer. The average thickness of the 180-Foot Aquifer and 400-Foot Aquifer is 100 and 200 feet, respectively. There is a deeper aquifer, the 900-Foot Aquifer or the Deep Aquifer, which has not been significantly developed. Municipal/irrigation well depths range from 120 to 807 feet and average 349 feet. The subbasin has an estimated 5.7 million AF of groundwater storage capacity and in 1994, there was approximately 4.5 million AF in storage. According to CDWR, 2003, the depth to the base of fresh water ranges from approximately 200 feet at the eastern Valley margin to 2,200 feet at the western Valley margin (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Forebay Aquifer subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the subbasin at 160,000 AFY and has assigned the subbasin a medium-priority ranking under the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a). TDS concentrations for groundwater range from 300 to 1,100 mg/L (CDWR, 2003).

The subbasin contains a portion of one oil and gas field with Federal mineral estate — Monroe Swell. As summarized in Table 3.7-4, the depth to the base of fresh water within the Monroe Swell field is estimated at 1,300 feet to 2,000 feet. The depth to the top of the hydrocarbon zone ranges from approximately 2,000 to 3,200 feet. Because the shallowest hydrocarbon zone depth (2,000 feet) is located in an area where the reported base of the fresh water is 1,300 feet deep, the smallest vertical separation between the base of fresh water and the top of the hydrocarbon zone is estimated at about 700 feet. Deeper zones in other parts of the field provide an estimated vertical separation of about 1,900 feet. In the hydrocarbon zone, a sodium chloride concentration is reported at 3,500 mg/L and TDS ranges from 4,800 mg/L to 5,300 mg/L. These salinities are in the range of TDS values for usable groundwater. The reported depths and TDS values associated with the Monroe Swell field indicate that usable groundwater may be in close proximity to hydrocarbon-bearing zones unless this zone contains an exempt aquifer (see Appendix J in DOC, 2015; DOC, 1998).

There is an exempt aquifer beneath the Monroe Swell field within the Santa Margarita Formation (Miocene), reported at an average depth of 800 feet. With the base of fresh water reported beneath the field at an average depth of 1,300 feet to 2,000 feet, the two zones appear to overlap. This may not be the case because the depths represent averages throughout the field.

Salinas Valley, Upper Valley Aquifer Subbasin (3-4.05). The Upper Valley Aquifer subbasin has a surface area of approximately 153 square miles located in the central/southern region of the Salinas Valley groundwater basin, between the Forebay Aquifer (3-4.04) and Paso Robles Area (3-4.06) subbasins (Figure 3.7-3). The subbasin is surrounded by the Gabilan Range on the east and the Sierra de Salinas and Santa Lucia Range on the west. Groundwater flow direction is to the northwest, along the axis of the valley. The primary aquifer is unconfined and within the Paso Robles Formation, alluvial fan and river deposits. Municipal/irrigation well depths range from 93 to 600 feet and average 235 feet. The subbasin has an estimated 3.1 million AF of groundwater storage capacity and in 1994, there was approximately 2.5 million AF in storage (CDWR, 2003). According to CDWR, 2003, the depth to the base of fresh water ranges from approximately 200 feet in the southern area of the subbasin to approximately 1,000 feet in the northern area of the subbasin.

The Basin Plan lists beneficial uses for groundwater in the Upper Valley Aquifer subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the subbasin at 125,000 AFY, and has assigned the subbasin a medium-priority ranking in the

CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a). As a result of poor quality surface water recharge from the Gabilan Range, groundwater along the eastern side of the subbasin has elevated TDS concentrations. TDS in the basin ranges from approximately 140 to 3,700 mg/L (CDWR, 2003).

The subbasin contains portions of two oil and gas fields involving Federal mineral estate: Monroe Swell and San Ardo. Details on the Monroe Swell field are summarized in the description of the Forebay Aquifer subbasin included above. The regional geologic setting of the San Ardo field is represented on a cross section across the Salinas Valley on Figure 3.7-4. As summarized on Table 3.7-4, the depth to the base of fresh water at the San Ardo field is reported to be 1,000 feet. The depth to the top of the hydrocarbon zones ranges from about 2,000 feet to 2,400 feet (Table 3.7-4). The vertical separation between the base of the fresh water and the top of the hydrocarbon zone is estimated at about 1,000 feet. In the hydrocarbon zone, sodium chloride concentrations range from 1,700 to 6,000 mg/L with a TDS value of 4,300 mg/L reported for a portion of the main area in the field. TDS and depth data indicate that usable groundwater is likely in close proximity to the hydrocarbon zones (see Appendix J in DOC, 2015; DOC, 1998).

There are four exempt aquifers beneath the San Ardo and Monroe Swell oil and gas fields, which may reduce the amount of usable water in the zone between the base of fresh water and the shallow hydrocarbons estimated above. Three of these exempt aquifers are below the San Ardo field. As summarized on Table 3.7-3, the depth to the top of the exempt aquifers beneath these fields varies from 800 feet (beneath the Monroe Swell field) to 900 feet (beneath the San Ardo field). The exempt aquifers are located either in the Santa Margarita Formation (Miocene) or the Monterey D and E Sand Formations (Miocene). As indicated by the conceptual cross section of the San Ardo field on Figure 3.7-4, the exempt aquifers in the Miocene-aged units do not appear to intersect the fresh water zone beneath the San Ardo field.

Salinas Valley, Paso Robles Area Subbasin (3-4.06). The Paso Robles Area subbasin covers approximately 932 square miles in both Monterey and San Luis Obispo Counties immediately south of the Upper Aquifer Valley subbasin (Figure 3.7-3). The subbasin is bounded on the south by the La Panza Range, on the east by the Temblor Range, and on the west by the Santa Lucia Range. Groundwater flow direction is to the northwest. The Paso Robles Formation is the primary water-bearing unit and reaches a thickness of up to 2,000 feet. The shallow alluvium, which ranges from 30 to 130 feet thick, has well yields that can exceed 1,000 gpm. In general, well yields in the subbasin range from 500 to 3,300 gpm. Estimates of storage capacity in the subbasin vary. CDWR, 1975, estimates total storage capacity to be 6.8 million AF whereas Fugro West, 2001, estimates storage capacity at more than 30.4 million AF. The average annual groundwater in storage between 1980 and 1997, as estimated by Fugro West, 2001, was 30.5 million AF (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Paso Robles Area subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the basin at 120,215 AFY and has assigned the basin a high-priority ranking in the CASGEM basin prioritization program (CDWR, 2014a). As previously mentioned, the basin has also been placed on the recently published Draft List of Critically Overdrafted Groundwater Basins (Table 3.7-2) (CDWR, 2015b). According to CDWR, TDS concentrations range from 346 to 1,670 mg/L and average 614 mg/L (CDWR, 2003).

The Paso Robles Area subbasin contains a portion of the San Ardo field, a small area of which occurs on Federal mineral estate. Data from this oil and gas field are included in the description of the Upper Valley Aquifer subbasin (3-4.05), provided above.

San Benito County

As shown on Table 3.7-2 and Figure 3.7-3, the groundwater basins on Federal mineral estate in San Benito County are Bitterwater Valley, San Benito River Valley, Gilroy–Hollister Valley, Hernandez Valley, Panoche Valley, and Vallecitos Creek Valley.

Bitterwater Valley (3-30). The Bitterwater Valley basin is in the Coast Ranges and consists of several valleys bounded by the Bear Valley Fault to the north and the San Andreas Fault Zone to the east. The basin is up to 18 miles long and 6 miles wide in the southwestern portion of the County and covers 50 square miles (Figure 3.7-3). Middle or lower Pliocene marine rocks bound the basin to the south and west. The valley areas consist of Quaternary alluvium and Plio-Pleistocene nonmarine rock. Groundwater flow is generally south to the Salinas River Valley. Well depths range from 67 to 390 feet and average 187 feet (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Bitterwater Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the basin at 3,023 AFY and has assigned the basin a very low-priority ranking for the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The Bitterwater Valley basin does not contain any oil and gas fields with Federal mineral estate.

San Benito River Valley (3-28). San Benito River Valley groundwater basin has a surface area of approximately 38 square miles and is located within the San Benito River Valley (Figure 3.7-3). The basin is bounded by fault contacts and there is no information about groundwater flow within or across basin boundaries. Based on CDWR's review of 33 well completion reports, well depths ranged from 36 to 600 feet and well yields were up to 2,000 gpm. Groundwater levels ranged from four to 59 feet based on well completion reports for wells constructed between 1955 and 1989 (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the San Benito River Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011).CDWR estimates groundwater use in the basin at 946 AFY and has assigned the basin a very low-priority ranking for the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The San Benito River Valley basin does not contain oil and gas fields with Federal mineral estate.

Gilroy–Hollister Valley, San Juan Bautista Area Subbasin (3-3.04). The San Juan Bautista Area subbasin encompasses 116 square miles in the southwest portion of the of the Gilroy-Hollister basin in northern San Benito County (Figure 3.7-3). The Sargent Fault and anticline and the Bolsa subbasin lie to the north, the San Andreas Fault and the Gabilan Range are to the southwest, and the Calaveras Fault and Hollister subbasin are to the east. Groundwater occurs in alluvium and Purisima Formation. Alluvial thickness ranges from 0 to 300 feet and the Purisima Formation thickness can range from the surface to several thousand feet. Consolidated rocks of the Jurassic age are believed to underlie the Purisima Formation (CDWR, 2003).

The Calaveras and Sargent faults that bound the subbasin restrict groundwater movement. The storage capacity of the entire Gilroy-Hollister basin is estimated at 932,000 AF but groundwater storage information for the subbasin is not readily available from CDWR. Well yields average 400 gpm. Groundwater generally flows to the northwest (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the San Juan Bautista Area subbasin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR estimates groundwater use in the subbasin at 13,530 AFY and has assigned a medium-priority ranking to the subbasin for the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The San Juan Bautista Area subbasin does not contain any oil and gas fields with Federal mineral estate.

Hernandez Valley (3-31). The Hernandez Valley basin is a small 4-square-mile basin (2,860 acres) in the Coast Ranges in southern San Benito County (Figure 3.7-3). Pliocene marine rocks lie to the northeast, the Franciscan Formation forms the northwest boundary, Lower Miocene marine sediments are to the north, and Upper Cretaceous marine sediments are to the south and southwest. The basin consist of alluvium and a small area of nonmarine terrace deposits. The Hernandez Reservoir occupies most of the southern basin. Well depths range from 20 to 160 feet and average 58 feet (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Hernandez Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011), although CDWR data indicate very low groundwater use in the basin (<100 AFY) (CDWR, 2014a). The basin is assigned a very low-priority ranking in the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The Hernandez Valley basin does not contain any oil and gas fields with Federal mineral estate.

Panoche Valley (5-23). The Panoche Valley basin encompasses 52 square miles in the Coast Ranges in eastern San Benito County (Figure 3.7-3). A very small portion of the basin extends into Fresno County. The Franciscan Formation lies to the northwest, Upper Cretaceous marine sedimentary rocks lie to the northeast and southeast, and Lower Miocene marine rocks lie to the southwest. Water bearing units may include alluvium, nonmarine terrace deposits and nonmarine sediments. Groundwater flow is generally to the east toward Tulare Lake. Well depths ranged from 171 to 1,500 feet and generally encounter alluvial materials including gravels, sands, silts and clays (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Panoche Valley basin as municipal and domestic supply (CRWQCB-CVR, 2004). CDWR estimates groundwater use in the basin at 200 AFY and has assigned a very low-priority ranking to the basin as part of the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a). TDS concentrations in groundwater range from 394 to 3,530 mg/L with an average of 1,300 mg/L (CDWR, 2003).

The Panoche Valley basin does not contain any oil and gas fields with Federal mineral estate.

Vallecitos Creek Valley (5-71). The Vallecitos Creek Valley basin encompasses 24 square miles in the Coast Ranges in eastern San Benito County (Figure 3.7-3). The basin is a northwest-southeast trending synclinal valley filled with alluvium and surrounded by nonmarine and marine sediments. Water bearing units may be limited to the shallow alluvium in the valley center. Three wells drilled in the northwest portion of the basin extend to depths of 80 to 122 feet. Groundwater flow is generally to the east toward Tulare Lake (CDWR, 2003).

The Basin Plan lists municipal and domestic supply as a beneficial use for groundwater in the Vallecitos Creek Valley basin (CRWQCB-CVR, 2004), although data from CDWR indicate only a relatively small amount of groundwater use in the basin (<500 AFY) (CDWR, 2014a). In addition, CDWR has assigned the basin a very low-priority ranking for the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The Vallecitos Creek Valley basin contains portions of one oil and gas field on BLM surface lands — the Vallecitos oil field. Figure 3.7-4 illustrates the regional geologic setting with a cross section across several areas of the Vallecitos field. As summarized on Table 3.7-4, the depth to fresh water beneath the Vallecitos field is reported to range from about 100 to 500 feet deep. The top of the hydrocarbon zone is reported to be as shallow as 80 feet, but that zone appears to be located in the hills outside of the groundwater basin boundary. Within the groundwater basin, the upper hydrocarbon zone is about 1,040 feet deep, providing a minimum vertical separation of about 540 feet to about 940 feet. Concentrations of sodium chloride in produced water are reported to range between about 1,100 mg/L to 3,600 mg/L. TDS concentrations in produced water are reported at 8,100 mg/L and 8,200 mg/L in two areas of the field. Depth and salinity data indicate that usable groundwater is in close proximity to hydrocarbon-bearing zones (see Appendix J in DOC, 2015; DOC, 1998).

Santa Cruz County

Santa Cruz Purisima Formation (3-21). The Santa Cruz Purisima Formation groundwater basin encompasses 63 square miles in central Santa Cruz County (Figure 3.7-2) and is defined by the Purisima Formation geologic boundary. The primary water bearing unit is the Purisima Formation, which is composed of moderately to poorly consolidated fine to medium-grained sandstone with interbeds of siltstone. The Purisima Formation is up to 2,000 feet thick and groundwater is primarily confined. Groundwater flows to the east in the northern portion of the basin and either to the southwest towards Monterey Bay or to the southeast towards Pajaro Valley in the remaining portions of the basin. Municipal/irrigation wells range from 61 to 833 feet deep and yield up to 200 gpm. Groundwater storage in the Purisima Formation, west of the Zayante Fault, is estimated to be 1.22 million AF. TDS concentrations range from approximately 300 to 600 mg/L (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Santa Cruz Purisima Formation basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR reports a groundwater use of about 15,000 AFY in the basin and has assigned a medium-priority ranking to the basin for the CASGEM basin prioritization program (Table 3.7-2) (CDWR, 2014a).

The Santa Cruz Purisima Formation basin does not contain any oil and gas fields with Federal mineral estate.

Pajaro Valley (3-2). The Pajaro Valley groundwater basin is 120 square miles and extends into Monterey and San Benito Counties (Figure 3.7-2). It is bounded by the Monterey Bay to the west, the San Andreas Fault to the east, the Purisima Formation to the north, and a drainage divide to the south. The Aromas Red Sands formation is the primary water-bearing unit in the basin and is composed of well sorted brown to red sands weakly cemented with iron oxide. The Aromas Red Sands formation ranges from 100 feet thick in the foothills to 900 feet near the mouth of the Pajaro River. Municipal/irrigation well depths range from 150 to 800 feet and yield between 100 and 2,000 gpm. Groundwater levels have decreased due to over pumping; between 34 and 51 square miles of the basin have groundwater levels below sea level. The total storage capacity of the basin is estimated to be approximately 7.7 million AF. TDS concentrations vary throughout the basin based on groundwater age. High TDS concentrations are found near the coast due to recent seawater intrusion and older seawater in the Purisima Formation has TDS concentrations that range from 3,000 to 30,000 mg/L (CDWR, 2003).

The Basin Plan lists beneficial uses for groundwater in the Pajaro Valley basin as municipal, domestic, agricultural, and industrial supply (CRWQCB-CCR, 2011). CDWR reports a groundwater use of approximately 67,000 AFY in the basin (CDWR, 2014a). CDWR has assigned the basin a high-priority ranking for the CASGEM basin prioritization program (CDWR, 2014a) and has also placed it on the Draft List of Critically Overdrafted Groundwater Basins (Table 3.7-2) (CDWR, 2015b).

The Pajaro Valley groundwater basin does not contain any oil and gas fields with Federal mineral estate.

Leases Subject to Settlement Agreement

The 14 leases subject to the settlement agreement are located in Monterey and San Benito Counties, as shown in purple on Figures 3.7-1 and 3.7-3.

In Monterey County, most of the leases subject to the settlement agreement do not occur within a groundwater basin. For the most part, the leases are located in the hills of the Coast Ranges between the Lockwood Valley groundwater basin (3-6) to the west, and the Salinas Valley to the east (Upper Valley Aquifer subbasin 3-4.05 and the Paso Robles Area subbasin 3-4.06). However, a small portion of the southernmost lease within Monterey County intersects the edge of the Salinas Valley, Paso Robles Area subbasin (3-4.06). None of the leases in Monterey County are in existing oil and gas fields.

The leases subject to the settlement agreement in San Benito County are predominantly located around the periphery of the Vallecitos Creek Valley groundwater basin (5-71), which is described above. Portions of several of the leases are within the basin boundary. Several of the leases are within or overlap portions of the Vallecitos oil field (see geologic cross section across portions of the Vallecitos oil field on Figure 3.7-4).

3.7.5 Recent Well Stimulation Treatment Studies

Several significant studies on well stimulation treatments have been published recently, including studies by the California Council on Science and Technology (2014 and 2015), the United States Geological Survey (Taylor et al., 2014), and the EPA (2015). These studies, along with other published scientific literature and information generated in compliance with recent legislation on well stimulation in California (SB 4), provide the framework for analyzing potential impacts to groundwater resources from well stimulation treatments. Key elements of these studies are summarized below. Potential impacts on groundwater resources from well stimulation treatments are analyzed in more detail in Section 4.7 of this EIS.

In August 2014, the California Council on Science and Technology (CCST) released a report on well stimulation entitled, "Advanced Well Stimulation Technologies in California, An Independent Review of Scientific and Technical Information." This report was commissioned in September 2013 to provide BLM with information to be used for "future planning, leasing, development decisions regarding oil and gas issues on the Federal mineral estate in California" (CCST, 2014). This report summarizes information available through February 2014, addressing hydraulic fracturing and well stimulation treatments in onshore oil reservoirs in California. The study also includes a section on Potential Direct Environmental Effects of Well Stimulation (Section 5), which includes an analysis of the potential impacts to water including groundwater (Section 5.1).

In December 2014, the USGS California Water Science Center completed a preliminary discussion paper entitled, "Oil, Gas, and Groundwater Quality in California — a discussion of issues relevant to monitoring the effects of well stimulation at regional scales" (Taylor et al., 2014). This study, prepared with the cooperation of the State Water Resources Control Board (SWRCB), is intended to provide the public, SWRCB, and experts convened by Lawrence Livermore National Laboratory (LLNL) with information on key policy issues, a potential scientific approach for regional groundwater monitoring, and potential strategies for implementation of groundwater monitoring criteria. This process was part of the development of groundwater monitoring criteria for well stimulation treatments in California as required by SB 4.

In June 2015, the EPA released a report entitled, "Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources" (EPA, 2015a). This report is in draft form and is subject to change. Because the study focuses on hydraulic fracturing across the nation, it does not contain as much California-specific information as the CCST report (2014). In fact, EPA's report relies heavily on CCST's findings. However, EPA's findings on the potential impacts of well stimulation on a national level may be applicable to California and are reviewed for the impacts assessment provided in Section 4.7 of this EIS.

In 2015, CCST completed a study on well stimulation entitled, "An Independent Scientific Assessment of Well Stimulation in California." The report was prepared for the California Natural Resources Agency pursuant to SB 4 and was published in three volumes:

- Volume 1: Well Stimulation Technologies and their Past, Present, and Potential Future Use in California (January 2015)
- Volume II: Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations (July 2015)
- Volume III: Case Studies of Hydraulic Fracturing and Acid Stimulations in Select Regions: Offshore, Monterey Formation, Los Angeles Basin, and San Joaquin Basin (July 2015)

Numerous additional publications from the scientific literature support the analysis of impacts to groundwater from hydraulic fracturing conducted herein (e.g., Carey et al., 2013; Chilingar and Endes, 2005; Horsley Witten Group, 2011; Howarth et al., 2012; Jackson et al., 2013; MRS, 2008). Because most of these papers were incorporated into the CCST analyses and support their conclusions, the additional papers are not cited or described separately.

3.8 Surface Water Resources

3.8.1 Introduction

This section describes baseline conditions for surface waters for the area covered by the Central Coast Oil and Gas Leasing and Development Resource Management Plan. The baseline conditions described herein are confined to surface waters relevant to oil and gas well exploration and production, including relevant regulatory issues, the regional setting, and current conditions and trends. The regional setting summarizes the topography, climate and major watersheds of the area. Current conditions and trends describe baseline floodplain conditions, water quality, and water use and supply.

3.8.2 Regulatory Framework

Surface water resources are managed and regulated by Federal, State and local regulations covering water quality, flooding, streambed alteration, and water management. Several regulations governing oil and gas activities cover surface water.

Federal Regulations

Clean Water Act (CWA) (33 USC Section 1251 et seq.). Formerly the Federal Water Pollution Control Act of 1972, the CWA was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA, enforced by the United States Environmental Protection Agency (EPA), requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water. Discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). NPDES permitting authority is delegated to, and administered by, the California State Water Resources Control Board (SWRCB) and its nine regional water quality control boards (RWQCBs).

Discharges from point sources are covered under the Industrial General Permit administered by the RWQCB. Discharges from construction activity are covered under the California General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Storm Water Permit). Both are described further below under State Regulations.

Section 401 of the CWA requires that any activity that may result in a discharge into waters of the U.S. be certified by the RWQCB. This certification ensures that the proposed activity not violate State and/or Federal water quality standards.

Section 404 of the CWA authorizes the U.S. Army Corps of Engineers to regulate the discharge of dredged or fill material to the waters of the U.S. and adjacent wetlands. Discharges to waters of the U.S. must be avoided where possible, and minimized and mitigated where avoidance is not possible. Permits are issued by the Corps of Engineers.

Section 303(d) of the Clean Water Act requires states to assess surface water quality and prepare a list of waters (known as the Section 303(d) list of water quality limited segments) considered to be impaired by not meeting water quality standards and not supporting their beneficial uses. Impairment may result from point-source pollutants or non-point source pollutants. The SWRCB, through its nine regional boards, assesses water quality and establishes Total Maximum Daily Load (TMDL) programs for streams, lakes and coastal waters that do not meet water quality standards.

Bureau of Land Management: Onshore Oil and Gas Operations (43 CFR Part 3160 et seq.). Regulations administered by the BLM to govern oil and gas operations require that operators conduct operations in a manner which protects the mineral resources, other natural resources, and environmental quality. Before approving any application for permit to drill, the BLM evaluates and considers environ-

mental impacts. Operators are required to exercise care and diligence to assure that leasehold operations not result in undue damage to surface or subsurface resources or surface improvements, which would include surface water. All produced water must be disposed of by injection into the subsurface, by approved pits, or by other methods which have been approved by the authorized officer. Upon the conclusion of operations, the operator must reclaim the disturbed surface in a manner approved or reasonably prescribed by the BLM. Spills or leakages of oil, gas, produced water, toxic liquids, or waste materials, and blowouts are reported to the BLM. Operators are required to control and remove pollutants that could affect surface waters.

The BLM rule on hydraulic fracturing complements existing regulations (set out at 43 CFR 3162.3–1 and Onshore Oil and Gas Orders 1, 2, and 7) designed to ensure the environmentally responsible development of oil and gas resources on Federal and Indian lands. Existing regulations establish that the BLM has authority to regulate oil and gas operations within its administrative areas, and set forth rules for the approval and conduct of these operations. Relevant to surface waters, the BLM rule on hydraulic fracturing and previous existing regulations require:

- Identification and documentation of surface waters and water supply in the application process.
- Restoration of disturbed areas.
- Waste handling requirements.
- Disposal of produced water into injection wells or lined pits with freeboard.
- Disclosure of the chemicals used in hydraulic fracturing fluids.
- Avoidance of riparian areas, floodplains, lakeshores, and/or wetlands except as approved in a plan of operations.
- Disclosure of information concerning the source and location of water supply, such as reused or recycled water, rivers, creeks, springs, lakes, ponds, and water supply wells, and the anticipated access route and transportation method for all water planned for use in hydraulic fracturing.
- Disclosure of the estimated total volume of fluid to be used in hydraulic fracturing.
- Disclosure of the estimated volume of fluid to be recovered and the proposed methods of handling and disposal of recovered fluids used in hydraulic fracturing.
- A surface plan of operation.
- Disposal of fluids recovered in hydraulic fracturing operations and in rigid enclosed, covered, or netted and screened above-ground tanks. Disposal in pits is allowed only if the distance to the nearest intermittent watercourse is 300 feet or more and 500 feet or more to perennial watercourses, and in a manner that would not interfere with the hydrologic function of the 100-year flood.

National Flood Insurance Act/Flood Disaster Protection Act. The National Flood Insurance Act of 1968 made flood insurance available for the first time. The Flood Disaster Protection Act of 1973 made the purchase of flood insurance mandatory for the protection of property located in Special Flood Hazard Areas. These laws led to mapping of regulatory floodplains and to local management of floodplain areas according to Federal guidelines which include prohibiting or restricting development in flood hazard zones. Local management of flood areas is described further under Local Regulations below.

State Regulations

California Streambed Alteration Agreement. Sections 1600–1616 of the California Fish and Game Code require that any entity that proposes an activity that will substantially divert or obstruct the natural flow of any river, stream or lake, substantially change or use any material from the bed, channel, or bank of any river, stream, or lake, or deposit material where it may pass into any river, stream, or lake,

must notify the California Department of Fish and Wildlife (CDFW). If the CDFW determines the alteration may adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement (LSAA) will be prepared. The LSAA includes conditions necessary to protect those resources. The Agreement applies to any stream including ephemeral streams and desert washes.

California Porter Cologne Water Quality Control Act. The Porter Cologne Water Quality Control Act of 1967, Water Code Section 13000 et seq., requires the SWRCB to adopt water quality criteria to protect State waters. Each RWQCB has developed a Water Quality Control Plan (Basin Plan) specifying water quality objectives, beneficial uses, numerical standards of pollution concentrations, and implementation procedures for Waters of the State. Waters of the State is defined by the Porter Cologne Water Quality Control Act as "any surface water or groundwater, including saline waters, within the boundaries of the State." General objectives of the Basin Plans state that all waters (of the State) shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or aquatic life. The water quality control plans are intended to protect designated beneficial uses of waters, avoid altering the sediment discharge rate of surface waters, and avoid introducing toxic pollutants to the water resource. The Porter Cologne Water Quality Control Act requires anyone proposing to discharge waste that could affect the quality of the waters of the State to report the waste discharge to the appropriate RWQCB.

SWRCB Storm Water Program General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Storm Water Permit). The General Construction Storm Water Permit, required by the Federal Clean Water Act, regulates stormwater runoff from construction sites of 1 acre or more in size. The Construction General Permit is a statewide, standing permit. Qualifying construction activities, which would include oil well projects where total disturbance is 1 acre or greater, must obtain coverage under the permit by filing a Notice of Intent with the Regional Water Quality Control Board, and development of and compliance with a Storm Water Pollution Prevention Plan (SWPPP) describing Best Management Practices (BMPs) the discharger will use to protect stormwater runoff. The SWPPP must contain a visual monitoring program, a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs, and a sediment monitoring plan if the site discharges directly to a water body listed on the Section 303(d) list (described below) for sediment.

The General Permit prohibits the discharge of pollutants other than stormwater and non-stormwater discharges authorized by the General Permit or another NPDES permit, and prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR Sections 117.3 and 302.4 (pursuant to Section 311 of the Clean Water Act), unless a separate NPDES Permit has been issued to regulate those discharges. In addition, the General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance are prohibited unless covered by an exception that the State Water Board has approved. Authorized non-stormwater discharges must be infeasible to eliminate; comply with BMPs as described in the SWPPP; filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins; meet the established numeric action levels for pH and turbidity; and, not cause or contribute to a violation of water quality standards. Discharges to stormwater that cause or threaten to cause pollution, contamination, or nuisance are prohibited. Pollutant controls must utilize best available technology (BAT) economically achievable for toxic pollutants and non-conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants.

The CWA provides definitions for the types of controls that can be used to satisfy BAT and BCT requirements. Specific BAT and BCT pollution controls and BMPs may include runoff control, soil stabilization, sediment control, proper stream crossing techniques, waste management, spill prevention and control, and a wide variety of other measures depending on the site and situation.

SWRCB Industrial Storm Water General Permit. The Industrial Storm Water General Permit regulates discharges to surface waters associated industrial activities including those associated with the oil

and gas industry. The General Industrial Permit requires the implementation of management measures that will achieve the performance standard of BAT and BCT. The General Industrial Permit also requires the development of a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce stormwater pollution are described.

Best Management Practices may include, but not be limited to, spill and overflow protection, stormwater control, covering of fueling areas, proper clean-up methods, spill prevention, preventative maintenance on equipment, inspections, and training. Specific best management practices will vary by situation and site. Guidance on the use of BMPs is available from the SWRCB.

California Code of Regulations Title 23. Title 23 regulates discharges of hazardous waste to land and establishes waste and site classifications and waste management requirements for waste treatment, storage, or disposal in landfills, surface impoundments, waste piles, and land treatment facilities.

California Code of Regulations Title 14. Title 14, Division 2, Chapter 4, of the California Code of Regulations authorizes regulation of onshore oil and gas wells by the California Department of Conservation Division of Oil, Gas and Geothermal Resources (DOGGR). Relevant provisions specific to surface water resources include a wide variety of water quality protections such as blowout prevention requirements; control, testing and disposal of drilling fluids; spill contingency plans; plugging and abandonment; freshwater protection; oilfield sumps (not permitted in natural drainage channels); secondary containment requirements; tank construction and leak detection; pipeline construction, maintenance and management; oilfield waste and refuse disposal; well site restoration; and special safety devices for wells within 100 feet of any navigable body of water or watercourse.

DOGGR regulations were added to Title 14 to address well stimulation treatments for oil and gas pursuant to California Senate Bill 4 (SB 4), amending Division 3, Chapter 1, of the Public Resources Code. The regulations specify actions that must be complied with prior to, during, and after an oil or gas well is stimulated or hydraulically fractured. The regulations require a variety of surface water protections for well stimulation activities including: disclosure, control and reporting of stimulation additives; development of a water management plan; storage and handling requirements for additives; waste control and disposal requirements; secondary containment requirements; testing, inspection, and maintenance requirements; spill contingency plans; notification and clean up in the event of an unauthorized release; and monitoring requirements.

California Water Right Law. California water law is embodied in the California Water Code and the Water Commission Act of 1914. There are two basic kinds of rights to surface water: riparian and appropriative.

Riparian rights usually come with owning a parcel of land that is adjacent to a source of water. A riparian right entitles the landowner to use a correlative share of the water flowing past his or her property, and do not require permits, licenses, or government approval. Riparian rights apply only to the water which would naturally flow in the stream, and do not entitle a water use to divert water to storage in a reservoir for use in the dry season or to use water on land outside of the watershed. Riparian rights remain with the property when it changes hands, although parcels severed from the adjacent water source generally lose their right to the water. Riparian rights have a higher priority than appropriative rights, and among themselves the priorities of riparian right holders generally carry equal weight. During a drought all share the shortage.

Appropriative rights are granted by the SWRCB. Anyone seeking to appropriate surface water must obtain a permit from the SWRCB. Water right permits spell out the amounts, conditions, and construction timetables for the proposed water project. Before the Board issues a permit, it must take into account all prior rights and the availability of water in the basin. The Board also considers environmental impacts and the flows needed to preserve instream uses such as recreation and fish and wildlife habitat. The hierarchy of priorities for appropriative rights is such that in times of shortage the most recent ("junior") right holder must be the first to discontinue use in favor of senior rights holders (SWRCB, 2014a).

Local Regulations

The project area includes all or portions of Monterey, Fresno, San Benito, Santa Clara, Santa Cruz, Alameda, Merced, Stanislaus, San Joaquin, Contra Costa, San Mateo, and San Francisco Counties. Cities are primarily in the San Francisco Bay area (San Francisco, Oakland, San Jose, and others), the Monterey Bay area (Santa Cruz, Marina, Monterey and others), and along the Salinas and San Benito Rivers or Pacific Coast (Hollister, Salinas, Soledad, King City, Carmel, and others). Most counties and cities have or are covered by urban water management plans and integrated regional water management plans that describe water planning, sources and supplies, agencies, water demand, water quality, goals and objectives, and other water use issues.

Counties and cities participating in the National Flood Insurance Program have floodplain and drainage regulations that regulate floodplain development. These regulations generally prohibit floodplain development that will result in flooding of the development itself, require flood proofing of new structures, and prohibit floodplain development that will result in adverse flooding impacts on other property.

Municipalities operating local municipal storm sewer systems are required to obtain NPDES permits from the RWQCB and develop and implement stormwater management programs to reduce the contamination of stormwater runoff and prohibit illicit discharges.

3.8.3 Regional Setting

Topography and Climate. The BLM Central Coast Field Office (CCFO) Planning Area terrain consists primarily of low, rolling hills and moderately sized mountains rising to elevations generally not more than about 5,000 feet above mean sea level, intersected by long, narrow, flat valleys. Mild winters and cool summers prevail in the northern and western portions of the CCFO Planning Area, with warmer summers and cooler winters in the south and further inland. Rainfall is seasonal, nearly all occurring in winter. At King City, near the center of the Federal mineral estate lands, summer maximum temperatures average 84 to 87 degrees Fahrenheit, with winter minimums 34 to 37 degrees. Annual rainfall is 11.25 inches, with 85% occurring between November and March (WRCC, 2015).

Watersheds and Surface Waters. The CCFO Planning Area is covered by 19 watersheds in four hydrologic regions as shown in Figure 3.8-1 and listed in Table 3.8-1. Most is in the Central California Coastal hydrologic region. These watersheds drain directly to the Pacific Ocean either at Monterey Bay (Estrella, Pajaro, Salinas, San Lorenzo–Soquel, and Alisal–Elkhorn Slough watersheds) or along the coast south of Monterey Bay (Carmel and Central Coast watersheds). With the exception of the San Francisco Coastal South watershed, which drains directly to the Pacific Ocean, all of the rest of the watersheds drain to the Pacific Ocean through San Francisco, San Pablo or Suisun Bays. Watersheds in the San Joaquin Hydrologic Region reach the San Francisco Bay by way of the San Joaquin River in the California Central Valley. The Tulare–Buena Vista Lakes hydrologic region is essentially a closed system, draining to the San Joaquin River only in extreme rainfall years (CDWR, 2013a).

Figure 3.8-2 shows the stream network and major rivers, which include the San Benito River, the Salinas River, and others. The major rivers are generally perennial through most of their length, carrying some flow at all seasons of the year, although summer and fall flows can be low due to lack of rainfall. For instance, the Salinas River at Soledad, in the vicinity of the Federal mineral estate within the CCFO Planning Area, averages a low of 121 cubic feet per second (cfs) in November and a high of 1,270 cfs in February (USGS, 2015a). The San Benito River in the vicinity of the main body of the Federal mineral estate approximately 40 miles upstream of Hollister averages 28 cfs in January and 0.8 cfs in September (USGS, 2015b).

Most of the streams shown in Figure 3.8-2 are small collector drainageways. The high map density of these streams is due to the hilly terrain, with a stream at the bottom of every small canyon. Due to the arid climate (about 11 inches of rain per year), most of these minor streams are dry during much of the year carrying flow only in response to rainfall.

Table 3.8-1. Hydrologic Regions and Watersheds of the CCFO Planning Area

Hydrologic Region	Watershed
San Francisco Bay	San Francisco Coastal South
	San Francisco Bay
	San Pablo Bay
	Suisan Bay
	Coyote
San Joaquin	San Joaquin Delta
	Middle San Joaquin–Lower Merced–Lower Stanislaus
	Panoche–San Luis Reservoir
	Middle San Joaquin–Lower Chowchilla
Central California Coastal	Pajaro
	Salinas
	San Lorenzo–Soquel
	Alisal–Elkhorn Slough
	Carmel
	Central Coast
	Estrella
Tulare–Buena Vista Lakes	Tulare–Buena Vista Lakes
	Upper Los Gatos–Avenal

3.8.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Floodplains. Figure 3.8-3 shows 100-year flood areas mapped by the Federal Emergency Management Agency (FEMA) (FEMA, 2015). Two floodplain zones are shown. The Zone A Approximate zone is delineated by approximate methods and could be substantially revised by detailed hydrologic and hydraulic analysis. The Detailed Study zone represents all of the other FEMA 100-year floodplain zones developed using detailed computations more accurate than the approximate methods.

The floodplains shown in Figure 3.8-3 represent only those floodplains that have been studied and approved by FEMA for inclusion on regulatory flood maps. Any watercourse carrying natural flow can produce a flood hazard and have a 100-year floodplain. Many watercourses, including most outside of urban areas, have not been mapped by FEMA and do not appear on these maps as hazard areas. Consequently, flood hazards, and related water quality contamination from flooded areas, could occur outside of the flood areas that are shown in Figure 3.8-3.

Surface Water Quality, Sediment and Erosion. The CCFO Planning Area is within the jurisdiction of the Central Coast, Central Valley and San Francisco Bay RWQCBs. The RWQCBs assess surface water quality throughout the State, and prepare a list of waters (the Section 303(d) list of water quality limited segments) considered to be impaired. Impairment may result from both point-source and non-point source pollutants. Figure 3.8-4 shows the location of waters considered by the RWQCBs to be impaired. Specific impairments are listed in the 2010 Statewide Integrated Report (SWRCB, 2015).

The following is a brief watershed-specific overview of water quality issues from the 2013 California Water Plan (CDWR, 2013b; CDWR, 2013c):

- **San Francisco Bay Hydrologic Region Watersheds.** Surface water quality issues include pathogens, nutrients, sediments, and toxic residues from urban runoff. Some toxic residues are from past human activities such as mining; industrial production; and the manufacture, distribution, and use of agricul-

tural pesticides. These residues include mercury, polychlorinated biphenyls (PCBs), selenium, and chlorinated pesticides.

Emerging pollutants in the San Francisco Bay region include flame retardants, perfluorinated compounds, nonylphenol fipronil, and pharmaceuticals. Sanitary sewer spills can occur because of aging collection systems and treatment plants. San Francisco Bay and a number of the streams, lakes, and reservoirs in the San Francisco Bay Region have elevated mercury levels from local mercury mining and mining activities in the Sierra Nevada and coastal mountains. Wastewater treatment plants and urban runoff also are a source of mercury, and some wetlands may contain significant amounts from contaminated sediments.

- **San Lorenzo River and Santa Cruz Area Watersheds.** Anthropogenic disturbances have accelerated the natural processes of erosion and sedimentation, resulting in declines in anadromous fisheries and the quality of fish habitat. Fecal coliform exceeds the basin plan criteria in many streams and sloughs.
- **Pajaro Watershed.** Water quality problems include erosion and sedimentation, pesticides, nutrients, heavy metals, pathogens, streambed flow alterations, endangered habitat, and riparian vegetation removal. Agriculture is the dominant land use in the watershed and grazing is common in the remote areas of the watershed such as along the upper San Benito River. Agricultural lands are the major source of nutrient and sediment loading into the Pajaro River. Low-density residential development, flood control projects, sand, gravel, and mercury mining, and off-road vehicle activity, have contributed to accelerated erosion and sedimentation, impacting steelhead habitat for migration and spawning. Fecal coliform levels in the Pajaro River and many of its tributaries exceed water quality objectives. Cyanobacteria cause harmful algal blooms in Pinto Lake near Watsonville.
- **Elkhorn Slough Watershed.** Water quality concerns include erosion, pesticides, bacteria, and scour. Agriculture and Moss Landing harbor activities, including ongoing dredging, are impacting the slough.
- **Carmel River Watershed.** There are currently no segments of the Carmel River identified as impaired. Tularcitos Creek is impaired for chloride, fecal coliform and sodium.
- **Salinas River Watershed.** Agriculture is the dominant land use within the Salinas watershed, and some agricultural practices have resulted in degradation of water resources. Surface waters are impacted by high levels of nitrate, as well as toxicity and pesticides. Impairments also include fecal coliform, nutrients, toxicity, and pesticides. Elevated nutrient concentrations have led to the degradation of municipal and domestic water supplies and have impaired most aquatic freshwater habitat beneficial uses for the lower Salinas River and its tributaries. The pesticides chlorpyrifos and diazinon are present in several areas at levels that are not protective of aquatic-life beneficial uses, such as fish habitat, migration, spawning and development.

The Clean Water Act mandates development of total maximum daily loads (TMDL) for water bodies listed as impaired. The TMDL is a limit on the amount of a pollutant that water body can regularly assimilate and still maintain beneficial uses. An approved TMDL establishes responsibility for controlling the pollutant, and implementation strategies to achieve the allowable amount of pollutant loading. TMDLs are currently being prepared by the RWQCBs for impaired waters within the CCFO Planning Area. Several, for instance TMDLs for Nitrate on the San Lorenzo and Pajaro rivers and TMDLs for sediment on the Pajaro River and San Benito River, have been approved (CDWR, 2009).

Each RWQCB develops a basin plan summarizing the assessment of surface water quality, outlining steps to improve water quality, and designating beneficial uses of surface waters. California State waters are protected against water quality degradation in order to preserve beneficial uses.

Examples of beneficial uses relevant to the Federal mineral estate within the CCFO Planning Area include (RWQCB, 2011):

- Salinas River: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Industrial Process Supply (PRO), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Cold Freshwater Habitat (COLD), Warm Freshwater Habitat (WARM), Migration of Aquatic Organisms (MIGR), Freshwater Replenishment (FRSH), Spawning, Reproduction, and/or Early, Development (SPWN), and Commercial and Sport Fishing (COMM).
- San Lorenzo Creek: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Warm Freshwater Habitat (WARM), Spawning, Reproduction, and/or Early Development (SPWN), and Commercial and Sport Fishing (COMM).
- San Benito River: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Warm, Freshwater Replenishment (FRSH), Warm Freshwater Habitat (WARM), and Commercial and Sport Fishing (COMM).
- Tres Pinos Creek: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Warm Freshwater Habitat (WARM), and Commercial and Sport Fishing (COMM).
- Arroyo Seco River: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Cold Freshwater Habitat (COLD), Freshwater Replenishment (FRSH), Warm Freshwater Habitat (WARM), Spawning, Reproduction, and/or Early, Development (SPWN), and Commercial and Sport Fishing (COMM).

Water Use and Supply. The San Francisco Bay Hydrologic Region depends heavily on surface water supplies, mostly imported from outside the region. Local streams are a significant water source in certain areas, especially in the South Bay, within the CCFO Planning Area. Groundwater provides only about 15 percent. Water use is predominantly urban, of which approximately 50 percent is residential. Agricultural use is minor, amounting to about 1percent of the total (CDWR, 2013c).

Water supplies in the San Joaquin Hydrologic Region consist of groundwater and surface water supplies. Surface water is mostly imported by the Central Valley Project or State Water Project, or derived from local sources. Rivers on the east side of the Central Valley, outside the CCFO Planning Area, provide most of the local sources. Agriculture is the largest user of water in this region, with urban use only a small portion of the total (CDWR, 2013d). The Tulare–Buena Vista Lakes Hydrologic Region has a similar pattern of supply and use, with substantial reliance on rivers on the eastern side of the Central valley (CDWR, 2013a).

The Central Coast Hydrologic Region within the CCFO Planning Area relies on local surface water, imported water and groundwater. The San Lorenzo River supplies the City of Santa Cruz. The Carmel River is an important source of supply for the Monterey area. Imported surface water from the Central Valley Project supplies other portions of this region within the Administrative Area. Overall, agriculture is the largest consumer of water within this hydrologic region (CDWR, 2013b).

The CCFO Planning Area includes surface reservoirs and aqueducts (Figure 3.8-1), some of which are downstream of Federal mineral estate lands. The San Luis Reservoir, on the east side of the Administrative Area and downstream of estate lands, is a storage reservoir for the State Water Project and Central Valley Project. The State Water Project and Central Valley Project also have major aqueducts running along the eastern boundary of the CCFO Planning Area. Hernandez Reservoir, on the San Benito River, in the area of the mineral estate lands, is used for flood control and groundwater recharge (Todd, 2011).

The State Water Project is a system of reservoirs and aqueducts collecting surface water from Northern California and the Sierra Nevada and conveying it to users in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The project, operated by the California Department of Water Resources, makes water deliveries to two-thirds of the population of California, with 70 percent of the supply going to urban users and 30 percent goes to agricultural users (CDWR, 2015).

The State Water Project provides irrigation water to farms in the San Joaquin Valley, and is a major source of supply for cities in Los Angeles, Riverside, San Bernardino, San Diego, and other parts of southern California. The Central Valley Project, operated by the U.S. Bureau of Reclamation, delivers water from northern California to the Central Valley. Both projects have conveyance and storage facilities along the eastern boundary of the CCFO Planning Area.

Naturally occurring asbestos occurs within the Clear Creek Management Area (CCMA). Water transport of asbestos to the California Aqueduct from the CCMA was detected in 1980. The asbestos was believed to have originated from the Atlas Asbestos Mine and was transported by water in White Creek to Los Gatos Creek and finally into the aqueduct (BLM, 2009, pg. 611). The Atlas Asbestos Mine, no longer operating, has been remediated by the EPA. The Aqueduct is protected by detention systems between the mine and the Aqueduct. Potential impacts to downstream users of the Aqueduct water are additionally protected by filtration and settling pond systems (EPA, 2015).

Water supplies within the State of California have been severely constrained in recent years due to an ongoing drought. During 2015, the Central Coast Oil and Gas Leasing and Development Resource Management Plan area remained in a severe to exceptional drought status (NDMC, 2015), and there are mandatory water restrictions statewide.

Aquatic Intactness. Aquatic intactness utilizes a common conservation planning approach of subwatershed-scale (HUC12) data summary and scoring, synthesizing and interpreting spatial data for 43 metrics consolidated into 22 indicators within the categories of surface water quality and quantity, sedimentation and erosion, surrounding surface management practices, habitat connectivity, and water temperature. The Aquatic Species Status group of indicators summarizes the findings of a new database for aquatic-dependent species, including all BLM Special Status Species that use freshwater habitats. The Aquatic Habitats Status indicators provide multiple summaries of a multi-source aquatic feature and land cover dataset. A group of Habitat Integrity indicators includes assessment of watershed condition, temperature conditions, habitat connectivity, water quality, water quantity, and land stewardship factors. Future threats are anticipated within indicators related to land conversion, resource extraction, climate change, water quality risk, and introduced species. The combined results map the pattern of relative condition of aquatic species, habitats, condition, and threats across a broad landscape. HUC12 subwatersheds with the highest aquatic intactness score are indicated on Figure 3.8-1 and include the Robinson Creek–South Fork Orestimba Creek, Red Creek–South Fork Orestimba Creek, Upper North Fork Pacheco Creek, Willow Creek, Salmon Creek–Frontal Pacific Ocean, and Upper Cantua Creek Subwatersheds.

Leases Subject to Settlement Agreement

The leases subject to the Settlement Agreement are primarily within the Salinas Watershed (southern lease grouping near Lockwood) or the Panoche–San Luis Reservoir Watershed (northern lease grouping). Most of the runoff from the northern grouping drains to the Central Valley via Panoche Creek. A small portion (roughly 1,800 acres) of the northern group is within the Upper Los Gatos–Avenal Watershed, and a smaller portion, roughly 60 acres, is within the Pajaro Watershed. The southern lease group is located in the hills between the San Antonio River (a tributary to the Salinas River) and the Salinas River. Runoff from these lease lands drains to the San Antonio River and the Salinas River. Drainage that reaches the San Antonio River passes through Lake San Antonio, operated by the Monterey County Water Resources

Agency for flood protection and water conservation. The northern lease lands drain primarily to the Panoche Creek watershed and into the Central Valley, although small portions drain to the Central Valley.

All of the lease lands are in hilly terrain. Local watercourses are numerous, but consist of small watersheds that are dry except following periods of rainfall due to the arid climate. None of the lease lands are in designated floodplains. Undesignated flood zones within the lease lands would be narrow and confined to the local canyon bottoms due to the steep terrain and relatively low discharges from the small watersheds.

Although there are no impaired waters within the area of the leases, all of the major receiving waters downstream of the lease areas are impaired. The San Antonio Reservoir is impaired for mercury. The San Antonio River is impaired for E. coli and fecal coliform. The Salinas River is impaired for E. coli, fecal coliform, pesticides, pH, temperature, turbidity, and unknown toxicity. A portion of Panoche Creek is impaired for mercury, sediment toxicity, sedimentation, and selenium.

Beneficial uses of the Salinas River are described above. Beneficial uses of the San Antonio River, San Antonio Reservoir, and Panoche Creek, are as follows (RWQCB, 1998, RWQCB, 2011):

- San Antonio River: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Service Supply (IND), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Cold Freshwater Habitat (COLD), Warm Freshwater Habitat (WARM), Migration of Aquatic Organisms (MIGR), Freshwater Replenishment (FRSH), Spawning, Reproduction, and/or Early, Development (SPWN), Preservation of Rare and Endangered Species (RARE), and Commercial and Sport Fishing (COMM).
- San Antonio Reservoir: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Cold Freshwater Habitat (COLD), Navigation (NAV), Warm Freshwater Habitat (WARM), Freshwater Replenishment (FRSH), Spawning, Reproduction, and/or Early, Development (SPWN), Preservation of Rare and Endangered Species (RARE), and Commercial and Sport Fishing (COMM).
- Panoche Creek: Agricultural Supply (AGR), Ground Water Recharge (GWR), Water Contact Recreation (REC 1), Non-contact Water Recreation (REC 2), Wildlife Habitat (WILD), Warm Freshwater Habitat (WARM), Preservation of Rare and Endangered Species (RARE), Industrial Service Supply (IND), and Industrial Process Supply (PRO).

3.9 Soil Resources

3.9.1 Introduction

Soil resources provide the foundation for vegetation and biological communities and safeguard water and air quality. Terrestrial and aquatic systems depend on the presence of suitable quality soils for their function. Soil quality is based on soil attributes, such as water holding capacity, texture, erosion potential, and slope.

Soils are the result of complex interactions among parent material (geology), climate, topography, organisms, and time. Soils are classified by the degree of development into distinct layers or horizons and their prevailing physical and chemical properties. Similar soil types are grouped into soil orders, based on defining characteristics, such as organic matter and clay content, amount of mineral weathering, water and temperature regimes, depth, drainage, slope, particle size or base saturation that give soil its unique properties. The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) soil surveys provide a detailed report on the soils of an area and identify limiting factors for its use and include interpretive ratings. They are designed to help guide the use of the soils.

Detailed NRCS soil surveys are available for most of the CCFO Planning Area; however, these are too specific for analysis at the regional scale for this RMPA. Individual soil map units would be used during review and approval of individual oil and gas lease applications for permit to drill.

Best Management Practices (BMPs, see Appendix D) for soils are applied to BLM actions and authorizations to limit compaction and reduce the potential for accelerated erosion through minimizing surface disturbance and reclaiming disturbed sites.

3.9.2 Regulatory Framework

Federal

Clean Water Act/National Pollutant Discharge Elimination System. Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it picks up pollutants like sediment, debris, and chemicals. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat and high volumes of runoff can cause stream bank erosion. Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Stormwater program requires operators of construction sites 1 acre or larger (including smaller sites that are part of a larger common plan of development) to obtain authorization to discharge stormwater under a NPDES construction stormwater permit. Implementation of stormwater pollution prevention plans (SWPPP) is the focus of NPDES stormwater permits for regulated construction activities.

Most states are authorized to implement the Stormwater NPDES permitting program. The United States Environmental Protection Agency (EPA) remains the permitting authority in a few states, territories, and on most land in Indian Country. For construction (and other land disturbing activities) in areas where the EPA is the permitting authority, operators must meet the requirements of the EPA Construction General Permit (CGP). In California, Stormwater NPDES permits on non-tribal and non-Federal land are overseen by the State of California EPA (CalEPA).

The **Resource Conservation and Recovery Act (RCRA)** established a program administered by the U.S. EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. The use of certain techniques for the disposal of some hazardous wastes was specifically prohibited by HSWA.

The **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),** including the Superfund program, was enacted by Congress on December 11, 1980. This law provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified. CERCLA also enabled the revision of the National Oil and Hazardous Substances Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants, spill containment, and cleanup. The NCP also established the National Priorities List. CERCLA was amended by the Superfund Amendments and Reauthorization Act on October 17, 1986.

The **Spill Prevention, Control and Countermeasures Plan (SPCC)** requires facilities that store, handle, or produce significant quantities of hazardous material to prepare plan to ensure that containment and countermeasures are in place to prevent release of hazardous materials to the environment.

State

The California State Water Resource Control Board (SWRCB) administers the Stormwater NPDES program in California. The SWPPP must list Best Management Practices (BMPs) the discharger will use to protect stormwater runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for non-visible pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body.

DTSC is a department of CalEPA and is the primary agency in California that regulates hazardous waste, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California. DTSC has authority under RCRA and the California Health and Safety Code (HSC). California's hazardous waste laws and regulations as implemented by DTSC are contained in HSC Division 20, Chapter 6.5, and CCR Title 22, Division 4.5. Activities subject to DTSC oversight include the generation, storage, treatment and disposal of hazardous waste and regulates cleanup of contaminated sites in the State, including industrial sites with soil and groundwater contamination. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

Local

Local city and county General Plans and/or SOAR (Save Open-Space & Agricultural Resources) Initiatives may provide regulations or guidelines relating to soil resources as it applies to agriculture.

The CCFO Planning Area contains multiple Certified Unified Program Agencies (CUPAs) that consolidate the administration, permitting, and inspection of hazardous material and hazardous waste programs, including underground and aboveground storage tanks, hazardous materials, and hazardous waste generator and treatment programs. CalEPA oversees the program as a whole, and certifies local government agencies known as CUPAs to implement the hazardous waste and materials standards set by five different State agencies, including CalEPA, DTSC, the Governor's Office of Emergency Services (CalOES), the California Department of Forestry and Fire Protection – Office of the State Fire Marshal (CAL FIRE – OSFM), and the SWRCB.

3.9.3 Regional Setting

Soil Types and Land Form

The CCFO Planning Area is within the southern Coast Ranges geomorphic province (CGS, 2002), which is characterized by summit elevations generally in the range of 2,000 to 4,000 feet (610 to 1,220 meters). Topography is generally not severe and rounded summits predominate; however, there are areas of steep slopes and incised canyons. The northwest trending ranges are subparallel to the San Andreas fault and are the result of extensive folding and faulting. The current landscape is a result of mountain-building episodes that began in the late Miocene and continued into the mid-Pleistocene. The majority of the Coast Ranges contains sedimentary deposits of both marine and terrestrial origin underlain by the basement rock of either the Franciscan Complex or granitic rocks of the Salinian Block. The Franciscan terrane occurs east of the San Andreas fault, and the Salinian Block to the west. The Franciscan Complex is an Early Cretaceous accretionary assortment containing blocks of greywacke, greenstone, blueschist, and serpentinized ophiolite (Oze, 2003).

The eastern edge of the San Joaquin Management Area extends into the Great Valley geomorphic physiographic province. The province is characterized by a great thickness of Jurassic age or younger marine and terrestrial sedimentary deposits. The San Joaquin Valley is known for very rich agriculture soils and large producing oil fields.

Erosion Prone Soils

Several factors affect the potential for soil erosion, including climate, vegetation, slope, and the physical characteristics of soil. Silt and fine sand are the soil textures most prone to erosion due to their small particle size and the lack of cohesion. Clay soils contain small soil particles but are more cohesive and therefore resist erosion by water and wind better than silt and fine sand. Gravel and coarse sand are not very cohesive but contain larger particles that are less susceptible to erosion by water and wind due to their size and weight. In addition to the erosion-prone soil textures described above, areas of high erosion are found on steep slopes, locations with sparse vegetation, and areas with high rainfall amounts and low infiltration capacity. Based on a review of RUSLE K-factor values (a measurement of soil erosivity), erosive soils can be found throughout the CCFO Planning Area. The largest concentration of highly erosive soils is found in the Call Mountains and the southern portion of the Diablo and Gabilan Ranges, south of Hollister, east of Pinnacles National Monument, north of California Highway 198, and west of the Panoche, Griswold, and Ciervo Hills (SWRCB, 2011). Prior to the commencement of any oil and gas production activities, a site-specific geologic and geotechnical analysis would be performed to identify erosion hazards and potentially erosive soils. BMPs for erosion and sediment control would be applied in erosion-prone areas.

Naturally Occurring Hazardous Materials

Some soils within the CCFO Planning Area include naturally occurring hazardous materials, such as asbestos found in serpentine soils and mercury, chromium, and other heavy metals found in soils surrounding past mining operations (BLM, 2013). These materials also can be found at a distance from past mining operations because some of these naturally occurring hazardous materials have been eroded and transported via stormwater runoff to downstream depositional areas (BLM, 2013).

Valley Fever

Valley Fever (*Coccidioidomycosis*) is a disease caused by the inhalation of the spores of *Coccidioides immitis*, a fungus which inhabits soils of the southwestern Unites States and is endemic in parts of California. The distribution and recognition of Valley Fever throughout the southwestern United States is poorly known (BLM, 2012). Portions of the CCFO Planning Area are known or suspected endemic areas

for valley fever (CDC, 2013). *C. immitis* grows as mold in the upper 5-20 cm of the soil in endemic areas and upon maturity can be released into the air as spores during surface disturbing actions; including wind episodes. Some key factors that influence the growth of *C. immitis* include temperature, the amount and timing of rainfall and available moisture (humidity), soil texture, alkalinity, salinity, and the degree of exposure to sunlight and ultraviolet light (BLM, 2012). The risk of infection as a result of inhalation can be reduced by implementing dust control measures.

3.9.4 Current Conditions and Trends

Central Coast Field Office Planning Area

The key soil related issues in the CCFO Planning Area are soil compaction and soil erosion caused by oil and gas leasing and development. Ground disturbance during grading of access roads, drill pads, and oil field facilities could result in soil erosion. Soil compaction due to routine use and vehicle traffic will occur along access roads and staging areas. To a less extent soil compaction may occur where geophysical surveys travel on otherwise undisturbed soil areas. Loose soil from grading and other ground disturbance, as well as compacted soils that reduce infiltration and increase runoff, can both be susceptible to increased erosion.

Central Coast Management Area

Soils in the Central Coast Management Area are generally less susceptible to erosion than the soils in other areas of the CCFO Planning Area. However, the Santa Cruz Mountains northeast of the City of Santa Cruz contain soils that are more highly susceptible to erosion (SWRCB, 2011). The Central Coast Management Area is dominated by the Mollisols soil order, which have a dark colored surface horizon that is relatively rich in organic matter (NRCS, 2015). Mollisols tend to be base rich throughout their horizon profile and tend to be quite fertile. The northern portion of this management area includes a substantial amount of Inceptisols, which occur in semiarid to humid environments and generally exhibit only a moderate amount of weathering and soil development (NRCS, 2015). The southern portion of this management area includes a substantial amount of Entisols, which exhibit little to no soil horizon development and which occur in areas of recently deposited parent materials or in areas where erosion and deposition rates are faster than soil development rates, such as sand dunes, steep slopes, or floodplains (NRCS, 2015).

San Joaquin Management Area

The San Joaquin Management Area covers a large area with diverse geology and soils. This management area contains large areas of soil that is highly susceptible to erosion, including the hills east of San Francisco Bay, the hills surrounding San Luis Reservoir, many areas throughout the Diablo Range, Panoche Valley and the hills west of Panoche Valley, and soils within Pleasant Valley in the southern portion of the management area (SWRCB, 2011). No single soil order dominates this management area. The northern portion of this management area contains Mollisols, Inceptisols, and Entisols, which are described above (NRCS, 2015). The northern portion also contains substantial amounts of Alfisols and Vertisols (NRCS, 2015). Alfisols occur in semiarid to moist areas and form primarily under forest or mixed vegetative cover. Weathering processes for this soil order leach clay minerals and other constituents out of the surface layer and into the subsoil, which then is capable of holding a high moisture content. Vertisols contain a large percentage of expanding clay minerals and tend to shrink and swell with changes in moisture content.

The southern portion of this management area contains substantial amounts of Alfisols, Entisols, Inceptisols, and Mollisols, which are described above (NRCS, 2015). In addition, the southeastern portion of this management area contains a substantial amount of Aridisols, which are too dry for the growth of mesophytic plants (NRCS, 2015). The low moisture content restricts the amount of weathering, and most

soil development is limited to the upper parts of the soils. Aridisols often accumulate gypsum, salt, calcium carbonate, and other materials that would otherwise be leached from soils in more humid environments. Soils in the southern portion of this management area, including those found within the Clear Creek Serpentine ACEC and those within the Big Blue Hills, contain naturally occurring asbestos, which can pose a hazard to human health if mobilized and inhaled (BLM, 2013).

San Benito Management Area

Of the four management areas within the CCFO Planning Area, this management area contains the largest percentage of soils that are highly susceptible to erosion. These soils are found mainly within the mountains and foothills of the Diablo Range (SWRCB, 2011). Roughly half of this management area is underlain by soils that are highly susceptible to erosion (SWRCB, 2011). Mollisols are the dominant soil order in this management area, but this area also contains substantial amounts of Alfisols, Entisols, and Vertisols (NRCS, 2015). All of these soil orders are described above. Soils in the southern portion of this management area, including those found within the Clear Creek Serpentine ACEC, contain naturally occurring asbestos, which can pose a hazard to human health if mobilized and inhaled (BLM, 2013).

Salinas Management Area

Soils within this management area are generally less susceptible to erosion than the soils found in both the San Joaquin and San Benito Management Areas, and are roughly comparable to the erosion susceptibility of the soils found within the Central Coast Management Area (SWRCB, 2011). Soils in this management area with a higher susceptibility to erosion are found in the southern portion of this area and are associated with the steeper slopes of the Santa Lucia Range and the Cholame Hills (SWRCB, 2011). Mollisols are the dominant soil order in this management area (NRCS, 2015). This area also contains a substantial amount of Entisols, and smaller amounts of Alfisols, Inceptisols, and Vertisols (NRCS, 2015). All of these soil orders are described above.

Leases Subject to Settlement Agreement

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located on erodible soils that do support little vegetation (low fertility) combining for high erosion potential.

3.10 Biological Resources – Vegetation

3.10.1 Introduction

The Planning Area consists of structurally and compositionally diverse plant communities that range from annual grasslands to Douglas fir forests. Variations in soils, terrain, climate, and geology support an unusual mosaic of species assemblages. As a result, the Planning Area hosts a number of unique plant communities and rare species. Examples of unique plant assemblages include:

- *Amsinckia furcata* and *Eriogonum nudum var. indictum* stands on the acidic, selenium-rich Moreno shale (eastern Panoche hills south to Coalinga);
- *Quercus x alvordiana* woodland patches in extremely arid locations on the acidic, gypsum-rich, selenium-rich Moreno shale (Cantua Creek drainage);
- *Lepidium jaredii ssp. album*, *Madia radiata*, *Deinandra halliana*, *Monolopia major*, *Convolvulus simulans*, and *California macrophylla* on gypsum-rich, vertic clay soils derived from the Moreno shale and Temblor shale;
- *Ephedra*-topped sand dunes on Monocline Ridge supporting Mojave disjunct species including *Abronia pogonantha*, *Oenothera deltoides*, and *Stipa hymenoides*; and
- mixed conifer forest consisting of *Pinus jeffreyi*, *P. coulteri*, *P. sabiniana*, and *Calocedrus decurrens* on serpentinite on San Benito Mountain.

Examples of rare species are local serpentine-endemic herbaceous plant species, including *Camissonia benitensis*, *Layia discoidea*, *Solidago guiradonis*, *Fritillaria viridea*, *F. falcata*, *Trichostema rubisepalum*, and *Monardella antonina ssp. benitensis*.

Ecological Site Inventories (ESIs) provide the basic inventory of present and potential vegetation on BLM land (Habich, 2001). The BLM monitors lands and vegetation to determine compliance with the Rangeland Health Standards and Guidelines (see Regulatory Framework, below). Corrective measurements are taken through appropriate management actions in areas where noncompliance with one or more of the standards is determined.

Project implementation plans, such as oil and gas extraction plans, provide for the protection, maintenance, and restoration of plant communities. The Central Coast Field Office (CCFO) requires that areas disturbed by oil and gas extraction are reclaimed to the extent possible.

The Planning Area is divided into four large geographic regions referred to as Management Areas: Central Coast, Salinas, San Benito, and San Joaquin. BLM land and split-estate comprises only a small portion of each Management Area. Within Management Areas, there may be smaller units designated as Special Management Areas (SMAs). SMAs are lands that are set aside for protection of important historic, cultural, biological, and natural resource features or restricted for human safety, see Section 3.14, Special Management Areas. SMAs include Areas of Critical Environmental Concern (ACEC) and Wilderness Study Areas (WSAs), as well as other designations. Within SMAs, focused management protects and enhances resource values and minimizes detrimental impacts.

The Proposed Resource Management Plan Final Environmental Impact Statement (RMP FEIS; BLM, 2006) describes the major vegetation communities found within the CCFO Planning Area. Unless otherwise indicated, the information below is summarized from the RMP FEIS and has been updated as needed.

3.10.2 Regulatory Framework

There are several Federal directives that guide BLM management of vegetation resources. These include:

Federal Laws, Regulations, and Agency Guidelines

National Environmental Policy Act (42 USC Section 4321 et seq.). Directs Federal policy regarding environmental protection, including requirements for Federal agencies to evaluate and publicly disclose the environmental effects of proposed projects in published documents such as environmental assessments or environmental impact statements (EISs).

Federal Land Policy and Management Act (43 USC Sections 1701–1787). Directs management of public lands managed by the BLM; addresses land use planning, rights-of-way, wilderness, and multiple use policies.

Wilderness Act (16 USC Sections 1131-1136). The 1964 Federal Wilderness Act provides for the designation of wilderness: Federal lands permanently preserved and protected in their natural condition. These lands are part of the National Wilderness Preservation System and are managed by the BLM, USFS, U.S. Fish and Wildlife Service (USFWS), and NPS.

Plant Protection Act (7 USC Section 7701 et seq.). Prevents importation, exportation, and spread of pests that are injurious to plants, and provides for the certification of plants and the control and eradication of plant pests. The Act consolidates requirements previously contained within multiple Federal regulations including the Federal Noxious Weed Act, the Plant Quarantine Act, and the Federal Plant Pest Act.

Clean Water Act (33 USC Sections 1251-1387). The Clean Water Act (CWA) regulates the chemical, physical, and biological integrity of the nation's waters. Section 401 of the CWA requires that an applicant obtain State certification for discharge into waters of the United States. The Regional Water Quality Control Boards administer the certification program in California. Section 404 of the CWA establishes a permit program, administered by the U.S. Army Corps of Engineers (USACE), to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

BLM Rangeland Health Standards and Guidelines. Establishes four fundamentals for managing rangelands and includes soils, species, riparian, and water quality standards. The standards describe the conditions needed to promote and sustain rangeland health and apply to all land uses.

Executive Order 13112, Invasive Species. This order established the National Invasive Species Council and directs Federal agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts caused by invasive species. It also provides that no Federal agency shall authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize risk or harm will be taken in conjunction with the actions.

BLM Integrated Vegetation Management Handbook. Describes a management approach to maintain and restore ecologically diverse, resilient, and productive native plant communities on public lands. Includes best management practices to be used in all programs, as appropriate, to mitigate impacts and achieve vegetation objectives, and describes pest management programs within BLM.

State Laws and Regulations

Lake and Streambed Alteration (Fish and Game Code Sections 1600-1616). The California Department of Fish and Wildlife (CDFW) regulates project activities that would divert, obstruct or change the natural flow, bed, channel, or bank of any river, stream, or lake.

3.10.3 Regional Setting

The CCFO Planning Area encompasses approximately 793,000 acres of public and private lands with Federal ownership of subsurface minerals. Varied landforms include the Central Coast Range, the Salinas and San Joaquin valleys, and three major watersheds that include the Pajaro, which drains into the Pacific Ocean, and the Arroyo Pasajero and Silver Creek, which drain east to the San Joaquin Valley. Lands in the Planning Area range in elevation from nearly sea level to over 5,000 feet. The climate is Mediterranean, characterized by hot, dry summers and cool, wet winters. Annual precipitation occurs primarily as winter rain and ranges from 4 to 8 inches in the rugged Panoche Hills on the eastern edge of the Diablo Range and the western edge of the San Joaquin Valley, to approximately 40 inches on the coast at Coast Dairies. The predominant vegetation communities found within the Planning Area are annual grassland, chaparral, and oak woodland.

3.10.4 Current Conditions and Trends

Central Coast Field Office Planning Area

BLM land within the Planning Area supports a variety of vegetation communities that can be grouped into eight major types: Blue Oak Woodland, Blue Oak–Foothill Pine, Valley Oak Woodland, Douglas Fir, Mixed Chaparral, Alkali Desert Scrub, Annual Grassland, and Perennial Grassland. In addition to the major vegetation communities, many other less predominant vegetation and habitat types may also be present. Two of these, riparian vegetation and vernal pools, are included among the descriptions below. In general, these vegetation communities are confined to small areas within the larger landscape; riparian vegetation is typically found in linear corridors along stream channels, and vernal pools are generally found in scattered patches, in nearly flat topography, surrounded by more predominant grassland or other vegetation. A description of each major vegetation community is provided below and the distribution of major vegetation communities within the Planning Area is shown on Figure 3.10-1a and 3.10-1b.

Blue oak woodland is a deciduous woodland found on hilly terrain from sea level to 2000 feet elevation. Dominant species are blue oak (*Quercus douglasii*), coast live oak (*Q. agrifolia*), valley oak (*Q. lobata*), and California juniper (*Juniperus californica*). This vegetation type is found in all four Management Areas and is a substantial component of the Salinas and San Benito Management Areas; see Table 3.10-1.

Blue oak–foothill pine is a mixed woodland found on hilly terrain from 500 to 3000 feet elevation. Dominant species are blue oak, foothill pine (*Pinus sabiniana*), interior live oak (*Quercus wislizeni*), and California buckeye (*Aesculus californica*). This vegetation type is found in the San Joaquin and Salinas Management Areas; see Table 3.10-1.

Valley oak woodland is a deciduous woodland found in valley bottoms and on gentle slopes from sea level to 3000 feet elevation. Dominant species are valley oak, white alder (*Alnus rhombifolia*), boxelder (*Acer negundo*), and Oregon ash (*Fraxinus latifolia*).This vegetation type is a relatively small component of all four management areas; see Table 3.10-1.

Douglas fir is a coniferous, closed-canopy forest found on rugged, steep slopes from 500 to 2000 feet elevation. Dominant species are Douglas fir (*Pseudotsuga menziesii*), tanoak (*Notholithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*), canyon live oak (*Quercus chrysolepis*), black oak (Q. kelloggii), ponderosa pine, Pacific yew (*Taxus brevifolia*), knobcone pine (*Pinus attenuata*). This vegetation type is a small component of the Central Coast and San Joaquin Management Areas and is found at the Coast Dairies and Santa Cruz Mountains; see Table 3.10-1.

Mixed chaparral is shrubland vegetation found on steep slopes and ridges from sea level to 5000 feet elevation. Dominant species are scrub oak (*Quercus berberidifolia*), ceanothus (*Ceanothus spp.*), manzanita (*Arctostaphylos spp.*), chamise (*Adenostoma fasciculatum*), birch leaf mountain mahogany (*Cercocarpus betuloides*), poison oak (*Toxicodendron diversilobum*), sumac (*Rhus spp.*), toyon (*Heteromeles arbutifolia*),

hollyleaf cherry (*Prunus ilicifolia*), and silktassel (*Garrya spp.*). This vegetation type is found in all four management areas and is a substantial component of the Salinas Management Area; see Table 3.10-1.

Alkali desert scrub is scrubland vegetation found on alkali playas and dry lakebeds from sea level to 3000 feet elevation. Dominant species are allscale (*Atriplex polycarpa*), spiny saltbush (*A. spinifera*), and big saltbush (*A. lentiformis*). This vegetation type is a major component of the San Joaquin Management Area; see Table 3.10-1.

Annual grassland is found on flat plains and rolling foothills from sea level to 3000 feet elevation. This vegetation community includes both native and non-native species. These non-natives are typically invasive and tend to dominate annual grasslands in California. Dominant native species are turkey mullein (*Croton setigerus*) and some true clovers (*Trifolium spp.*). Dominant non-native species are wild oats (*Avena spp.*), soft chess (*Bromus hordeaceus*), ripgut brome (*B. diandrus*), red brome (*B. madritensis ssp. rubens*), wild barley (*Hordeum spp.*), foxtail fescue (*Festuca myuros*), broad leaf filaree (*Erodium botrys*), redstem filaree (*E. cicutarium*), true clovers (*Trifolium spp.*), bur clovers (*Medicago spp.*), and popcorn flowers (*Cryptantha spp.* and *Plagiobothrys spp.*). This vegetation type is a major component of all four management areas; see Table 3.10-1.

Perennial grassland is found at higher elevations with higher annual precipitation. Dominant native species are Nevada blue grass (*Poa secunda*; in more arid areas), foothill needle grass (*Stipa lepida*), California melic (*Melica californica*), and western wild-rye (*Elymus glaucus*). This vegetation type is a small component of the San Joaquin Management Area; see Table 3.10-1.

Riparian vegetation is found along the banks and floodplains of streams, rivers, and other bodies of fresh water. Valley foothill riparian is found in the lower elevations, while montane riparian is generally found at higher elevations. Riparian vegetation includes trees, shrubs, and herbaceous plants. Typical species are willow (*Salix* spp.), cottonwood (*Populus* spp.), and alder (*Alnus* spp.). Many riparian areas in arid landscapes may have perennial, intermittent, episodic, or ephemeral surface or subsurface water flow. Isolated springs may create localized patches of riparian vegetation. Riparian vegetation often includes wetlands, such as marshes, bogs, and swamps, which are associated with a permanent or ephemeral source of fresh water. Typical marsh species are cattails (*Typha* spp.), rushes (*Juncus* spp.), and sedges (*Carex* spp.).

Vernal pools are seasonal freshwater wetlands that form when rainwater collects in natural depressions where the soil is relatively impervious to water infiltration. Vernal pools support a unique suite of plants and animals adapted to survive seasonal wetland conditions that vary from year to year depending on rainfall. Typical species are downingia (*Downingia* spp.) and meadow foam (*Limnanthes* spp.). Vernal pools may be found in many portions of the Planning Area.

Jurisdictional Waters

For the purposes of environmental review, wetlands are addressed both as habitat and as waters of the U.S. or waters of the State under the jurisdiction of the USACE, the State Water Resources Control Board (SWRCB), and the CDFW. Wetlands are characterized by (1) permanent or periodical saturation or inundation, (2) specific "hydric" soil conditions resulting from saturation, and (3) vegetation adapted to saturated soil conditions. In addition to wetlands, many streambeds, lakebeds, or other hydrologic features may meet jurisdictional criteria based on presence of bed and bank, or ordinary high water mark. Jurisdictional waters may be found throughout the Planning Area. These waters and wetlands often provide important habitat for plants, fish, and wildlife.

Noxious and Invasive Weeds

Noxious and invasive weeds are an increasing problem on BLM lands throughout the west. Over 180 weed species have been identified in the Planning Area (CCH, 2015; Cal-IPC, 2015). Of particular con-

cern on BLM lands in the Planning Area are tamarisk (*Tamarix* spp.), Russian thistle (*Salsola* spp.), and yellow starthistle (*Centaurea solstitialis*) in the San Joaquin Management Area; iceplant (*Carpobrotus* spp.), pampasgrass (*Cortaderia* spp.), French broom (*Genista monspessulana*), and German ivy (*Delairea odorata*) in the Central Coast Management Area; yellow starthistle and tocalote (*Centaurea melitensis*) in the San Benito Management Area; and yellow starthistle in the Salinas Management Area.

Non-native invasive plants that become established in a new area may displace native species (including special status species or plants that provide food or cover for wildlife), alter natural habitat structure, and increase wildfire frequency (Zouhar et al., 2008, pg. 34; Lovich and Bainbridge, 1999, pg. 313). Some weeds are poisonous or cause physical injury to wildlife, livestock, and people. These plants are considered "weeds" or "pest plants" in natural landscapes (Bossard et al., 2000). Invasive weeds generally spread most readily in disturbed, graded, or cultivated soils, including soils disturbed by construction equipment. Weeds and pest plants are not limited to "noxious weeds" as defined by the USDA, but are defined here to include any species of non-native plants identified on the weed lists of the California Department of Food and Agriculture, the California Invasive Plant Council, or of special concern identified by BLM.

Management Areas

A brief description of each of the four Management Areas within the Planning Area, including major vegetation communities, is provided below. Table 3.10-1 provides the area occupied by each major vegetation type within the Management Areas.

Central Coast Management Area

There are two areas of BLM-administered lands within the Central Coast Management Area — Coast Dairies and the Fort Ord National Monument. Neither of these areas is available for oil and gas development; the following is presented for informational purposes only. In aggregate, major vegetation communities on BLM lands in the Central Coast Management Area are mainly annual grassland with a substantial component of chaparral and relatively small amounts of blue oak woodland, Douglas fir forest, and valley oak woodland; see Table 3.10-1. More detailed vegetation community descriptions of Coast Dairies and Fort Ord National Monument are provided below.

Vegetation communities within the Coast Dairies include a mixture of native and non-native grassland, upland scrubland, wetland, riparian scrub and forest, and upland oak, mixed evergreen, and redwood forests. The Coast Dairies supports high-quality wildlife habitat in those areas that have not been directly affected by agricultural practices or development. The Coast Dairies is managed by BLM, in conjunction with the California Department of Parks and Recreation (CDPR), as outlined in the Long-term Resource Protection and Access Plan (ESA, 2003).

Vegetation communities on Fort Ord National Monument include mainly maritime chaparral, oak woodland, and grassland. Other vegetation types are riparian, coastal strand and dune, coastal scrub, and vernal pool (USACE, 1997; Shaw, 2007). Fort Ord is a former military base, closed in 1994, and the BLM manages Fort Ord as described in a Habitat Management Plan (HMP; USACE, 1997). The Fort Ord Reuse Authority (FORA), a non-profit local government agency, also participates in management of the area. FORA has developed a draft Habitat Conservation Plan (HCP) that, if approved, would replace the management direction in the HMP (FORA, 2015).

Salinas Management Area

This Management Area includes steep rugged terrain in the Sierra de Salinas Range, which parallels the Santa Lucia Range to the west. Vegetation in the Management Area is mainly annual grassland, chaparral, and blue oak woodland, but on BLM lands it is predominantly dense chaparral with small areas of blue oak savannah. The western portion of the Management Area lies in a zone of coastal influence, and

fog often blankets all but the upper elevations during the spring and summer months. There are numerous intermittent drainages, and permanent water sources include the Arroyo Seco, Carmel, and Salinas Rivers. Another permanent water source is the San Antonio River, a perennial tributary to the Salinas River that is dammed to form the San Antonio Reservoir.

San Benito Management Area

The predominant feature in this Management Area is the Diablo Range, with its rugged, steep topography. Serpentine outcrops are common throughout this area. The overall vegetation in the Management Area is highly variable with annual grasslands and oak woodland in valleys and chaparral and oak woodland on slopes. The San Benito River originates near San Benito Mountain, flows northwest through the San Benito Management Area, and out to Monterey Bay.

San Joaquin Management Area

The San Joaquin Management Area lies within the Central Valley of California. Major vegetation communities in the Management Area are mainly annual grassland, blue oak–foothill pine woodland, and blue oak woodland.

The USFWS has prepared the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS, 1998) that addresses 34 special status plant and animal species that occur in this area. A number of these species occur on BLM lands. This Management Area includes several management units with areas designated for special status species. These management units are the Panoche Hills, Griswold-Tumey Hills, Ciervo Hills/Joaquin Rocks, and Coalinga. These areas are further discussed in Section 3.12 (Special Status Species) of this document.

Table 3.10-1. Percent of Management Area Occupied by Each Major Vegetation Community

Vegetation Community	Central Coast	Salinas	San Benito	San Joaquin
Blue Oak Woodland	3	22	34	7
Blue Oak–Foothill Pine	0	2	0	14
Valley Oak Woodland	<1	<1	1	2
Douglas Fir	3	0	0	<1
Mixed Chaparral	15	24	5	3
Alkali Desert Scrub	0	0	0	<1
Annual Grassland	79	52	60	74
Perennial Grassland	0	0	0	<1

Source: BLM, 2006 with updates from BLM staff (2015).

Leases Subject to Settlement Agreement

Below is a brief description of the setting of each of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749. The leases are described in Sections 2.6 through 2.10 for each alternative and are shown on Figures 2-1 through 2-5. General information on each lease site was derived from inspection of Google Earth imagery (Google, 2015), and should be considered preliminary, subject to field verification. Descriptions include major vegetation communities, but may not include all vegetation types and habitats present on the site.

CACA 052959 is located within the Salinas Management Area and is found on the Espinosa Canyon U.S. Geological Survey (USGS) topographic quadrangle (topo quad). The site is in rugged hilly terrain west of the Salinas Valley and includes a few old trails or fuelbreaks, some of which are at least partially overgrown. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral and annual grassland. Elevation ranges from around 850 to 1800 feet.

CACA 052960 is located within the Salinas Management Area and is found on the Tierra Redondo Mountain and Hames Valley USGS topo quads. The site is in rugged hilly terrain southwest of the Salinas Valley. The site includes several dirt roads or trails, scattered small structures, and areas that may have been grazed or disced. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral and annual grassland with scattered trees, possibly oaks. Elevation ranges from around 900 to 1700 feet.

CACA 053824 is located within the Salinas Management Area in the Williams Hill area, and is found on the Espinosa Canyon and San Ardo USGS topo quads. The site is in rugged hilly terrain west of the Salinas Valley and includes several dirt roads or trails, a few structures, and some areas of disturbance. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral and annual grassland. Elevation ranges from around 900 to 1600 feet.

CACA 053825 is located within the Salinas Management Area in the Williams Hill area, and is found on the Williams Hill, Espinosa Canyon, Hames Valley, and San Ardo USGS topo quads. The site is in rugged hilly terrain west of the Salinas Valley and includes several dirt roads or trails, including Lockwood San Ardo Road. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral with some annual grassland and scattered trees, possibly oaks. Elevation ranges from around 1000 to 2200 feet.

CACA 053826 is located within the Salinas Management Area in the Williams Hill area, and is found on the Hames Valley USGS topo quad. The site is in rugged hilly terrain west of the Salinas Valley and includes several dirt roads or trails and a corral with associated structures. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are primarily chaparral with annual grassland on some parcels. Elevation ranges from around 1200 to 2400 feet.

CACA 053827 is located within the Salinas Management Area in the Williams Hill area, and is found on the Williams Hill USGS topo quad. The site is in hilly terrain west of the Salinas Valley and includes several dirt roads or trails and an area of disturbance. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral with some annual grassland and oak woodland. There are also some rocky outcrops with minimal vegetation. Elevation ranges from around 1600 to 2300 feet.

CACA 053828 is located within the San Joaquin Management Area in the Call Mountain–Hernandez Valley area, and is found on the Panoche and Llanada USGS topo quads. The site is in rugged hilly terrain and includes large areas of grassland that may have been grazed. A few dirt roads or trails are evident, including one to the summit of Buck Peak. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral and annual grassland with some scattered trees, possibly oaks. There are also rocky outcrops with minimal vegetation. Elevation ranges from around 2000 to 3500 feet.

CACA 053829 is located within the San Joaquin Management Area in the Call Mountain–Hernandez Valley area, and is found on the Panoche USGS topo quad. The site is in rugged hilly terrain and includes large areas of grassland that may have been grazed. A few dirt roads or trails are evident, including Union Canyon Road. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are primarily annual grassland with some chaparral. Elevation ranges from around 2100 to 2900 feet.

CACA 053830 is located within the San Joaquin Management Area in the Call Mountain–Hernandez Valley area, and is found on the Panoche, Tumey Hills, Hernandez Reservoir, and Idria USGS topo quads. The site is in hilly terrain, rugged in places, and includes large areas of grassland that may have been grazed. There are a few roads or trails. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are primarily annual grassland with some chaparral. Elevation ranges from around 2100 to 2900 feet.

CACA 053831 is located within the San Joaquin Management Area in the Call Mountain–Hernandez Valley area, and is found on the Hernandez Reservoir USGS topo quad. The site is in rugged hilly terrain and includes some areas of grassland that may have been grazed. There are a few dirt roads or trails. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are chaparral and annual grassland. Elevation ranges from around 1900 to 4000 feet.

CACA 053832 is located within the San Joaquin Management Area in the Call Mountain–Hernandez Valley area, and is found on the Hernandez Reservoir and Idria USGS topo quads. The site is in rugged hilly terrain and includes some areas of grassland that may have been grazed. There are a few dirt roads or trails. Drainages on the site are likely to support intermittent or ephemeral flows. One larger drainage on the site may have perennial flow. Major vegetation communities are chaparral and annual grassland. Elevation ranges from around 1900 to 3500 feet.

CACA 053833 is located within the San Joaquin Management Area in the Griswold-Tumey Hills area, and is found on the Tumey Hills and Idria USGS topo quads. The site is in rugged hilly terrain and includes areas of grassland that may have been grazed. There are a few dirt roads or trails. Drainages on the site are likely to support intermittent or ephemeral flows. The major vegetation community is annual grassland. Elevation ranges from around 1500 to 2500 feet.

CACA 053834 is mainly located within the San Joaquin Management Area with a small section in the San Benito Management Area. It is in the Griswold-Tumey Hills area, and found on the Idria USGS topo quad. The site is in rugged hilly terrain and includes areas of grassland that may have been grazed. There are a few dirt roads or trails, including Tumey Gulch Road. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are annual grassland and chaparral. Elevation ranges from around 1900 to 2500 feet.

CACA 053835 is located within the San Joaquin Management Area in the Griswold-Tumey Hills area, and is found on the Idria USGS topo quad. The site is in rugged hilly terrain and includes areas of grassland that may have been grazed. There are a few dirt roads or trails, including New Idria Road. Drainages on the site are likely to support intermittent or ephemeral flows. Major vegetation communities are annual grassland and chaparral. Elevation ranges from around 1600 to 2900 feet.

3.11 Biological Resources – Wildlife Habitat

3.11.1 Introduction

The RMP FEIS (BLM, 2006) describes the key fish and wildlife resources found within the Planning Area. The information below is summarized from the RMP FEIS and has been updated as needed.

Over 300 species of birds, mammals, reptiles, and amphibians occur or have the potential to occur within the Planning Area. These include several species of rare, threatened, and endangered animals, such as the San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), giant kangaroo rat (*Dipodomys ingens*), mountain plover (*Charadrius montanus*), and burrowing owl (*Athene cunicularia*).

In analyzing management actions, this EIS addresses key species and their habitats. Key species include those of economic interest (e.g., native and non-native game animals); species or groups that serve as indicators of ecosystem health or the effects of management activities; and sensitive, rare, threatened, and endangered (RTE) species. Game animals may also be considered indicator species.

Game and indicator species include California mule deer (*Odocoileus hemionus californicus*) and Columbian black-tailed deer (*O.h. columbianus*), tule elk (*Cervus elaphus nannodes*), wild pig (*Sus scrofa*), mountain lion (*Felis concolor*), wild turkey (*Meleagris gallopavo*), California quail (*Callipepla californica)* and chukar (*Alectoris chukar*), and small game, nongame, and fur-bearing mammals.

Small game includes desert cottontail rabbit (*Sylvilagus auduboni*), brush rabbit (*Sylvilagus bachmani*), blacktailed jackrabbit (*Lepus californicus*), and western gray squirrel (*Sciurus griseus*). Nongame species include bobcat (*Lynx rufus*), coyote (*Canis latrans*), and California ground squirrel (*Spermophilus beecheyi*). Fur-bearing mammals that occur within the Planning Area are gray fox (*Urocyon cinero-argenteus*), raccoon (*Procyon lotor*), and American badger (*Taxidea taxus*).

RTE plant and wildlife species are described in Section 3.12 (Special Status Species) of this document.

The Planning Area is within habitat that supports fauna representative of the central coast and the Central Valley. Vegetation communities are described in Section 3.10 (Vegetation) of this document. Table 3.11-1 lists the major vegetation communities found within the Planning Area and the key wildlife species typically associated with each.

Table 3.11-1. Major Vegetation Communities and Associated Key Wildlife Resources

Vegetation Community	Associated Key Wildlife Resources
Blue Oak Woodland Blue Oak–Foothill Pine Valley Oak Woodland Douglas Fir	Game and indicator: game species, mountain lion RTE: bats, raptors (nesting and roosting)
Mixed Chaparral	Game and indicator: game species, mountain lion RTE: bats, big-eared kangaroo rat, Bell's sage sparrow, coast horned lizard
Alkali Desert Scrub	RTE: Buena vista lake shrew, Fresno kangaroo rat, San Joaquin (Nelson's) antelope squirrel, San Joaquin kit fox, Tipton kangaroo rat, Tulare grasshopper mouse, giant kangaroo rat, San Joaquin Valley woodrat, riparian brush rabbit, short-nosed kangaroo rat, San Joaquin LeConte's thrasher, blunt-nosed leopard lizard, Ciervo aegialian scarab beetle, Doyen's trigonascuta dune weevil, San Joaquin dune beetle
Annual Grasslands Perennial Grasslands	Game and indicator: game species, mountain lion RTE: coast horned lizard, Buena Vista Lake shrew, Fresno kangaroo rat, San Joaquin (Nelson's) antelope squirrel, San Joaquin kit fox, Tipton kangaroo rat, Tulare grasshopper mouse, giant kangaroo rat, San Joaquin Valley woodrat, riparian brush rabbit, short-nosed kangaroo rat, San Joaquin LeConte's thrasher, blunt-nosed leopard lizard, Ciervo aegialian scarab beetle, Doyen's trigonascuta dune weevil, San Joaquin dune beetle

Table 3.11-1. Major Vegetation Communities and Associated Key Wildlife Resources

Vegetation Community	Associated Key Wildlife Resources
Riparian	Game, indicator, and RTE species may utilize riparian areas for movement corridors, water sources, or refugia, and foraging, roosting, or sheltering habitat
Vernal Pool	RTE: fairy and tadpole shrimp, California tiger salamander, western spadefoot toad

3.11.2 Regulatory Framework

There are several directives that guide BLM management of wildlife resources and habitat. In addition to those listed in Section 3.10.2, these include:

Federal Laws and Regulations

Endangered Species Act (16 USC Sections 1531–1544). BLM Handbook H-6840. The Endangered Species Act (ESA) establishes legal requirements for the conservation of endangered and threatened species and the ecosystems upon which they depend. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial species, and by the National Marine Fisheries Service (NMFS) for marine species and anadromous fish. Under the ESA, the USFWS or NMFS may designate critical habitat for listed species. Section 7 of the ESA requires Federal agencies to consult with USFWS or NMFS to ensure that their actions are not likely to jeopardize listed threatened or endangered species, or cause destruction or adverse modification of critical habitat. Section 10 of the ESA requires similar consultation for non-Federal applicants.

Migratory Bird Treaty Act (16 USC 703–712). The Migratory Bird Treaty Act (MBTA) prohibits take of any migratory bird, including eggs or active nests, except as permitted by regulation (e.g., licensed hunting of waterfowl or upland game species). Under the MBTA, "migratory bird" is broadly defined as "any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle" and thus applies to most native bird species. The MBTA does not cover non-native species such as house sparrows, European starlings, and rock doves.

Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996. Establishes procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. EFH includes those waters and substrates necessary for fish to spawn, breed, feed, and grow to maturity. Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include historic areas if appropriate. Freshwater EFH for pacific salmonids includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassible man-made, and long standing, naturally impassable barriers. The act requires Federal agencies to consult with the National Oceanic and Atmospheric Administration Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

Clean Water Act (33 USC Sections 1251–1387). The Clean Water Act (CWA) regulates the chemical, physical, and biological integrity of the nation's waters. Section 401 of the CWA requires that an applicant obtain State certification for discharge into waters of the United States. The Regional Water Quality Control Boards administer the certification program in California. Section 404 of the CWA established a permit program, administered by the U.S. Army Corps of Engineers (USACE), to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

Coastal Zone Management Act (16 USC 1451–1464). The Coastal Zone Management Act (CZMA) established a Federal and State partnership for coastal resource management. Federal projects must be consistent with the State's certified program. A Federal agency must provide a consistency determination

to the Federal Consistency Unit of the California Coastal Commission (which implements the Federal CZMA as it applies to Federal activities in California) no later than 90 days before final approval of the Federal activity.

Executive Order 13186. Directs Federal agencies that take actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with USFWS to promote the conservation of migratory bird populations.

Executive Order 11990, Protection of Wetlands. This order directs Federal agencies to avoid to the extent possible the long- and short-term adverse impacts from the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Executive Order 11988, Floodplain Management. This order directs Federal agencies to avoid the long-term and short-term adverse impacts of occupancy and modification of floodplains, and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

State Laws and Regulations

Birds (Fish and Game Code Sections 3503 and 3513). The California Fish and Game Code prohibits take, possession, or needless destruction of birds, nests, or eggs except as otherwise provided by the code. Section 3503.5 prohibits take or possession of birds of prey or their eggs, and Section 3513 prohibits take or possession of any migratory nongame bird. Section 3513 provides for the adoption of the provisions of the Federal Migratory Bird Treaty Act (see Section 3.11.2).

3.11.3 Regional Setting

The fish and wildlife resources on BLM land within the Planning Area are managed by two agencies, the BLM and the California Department of Fish and Wildlife (CDFW), in consultation with the U.S. Fish and Wildlife Service (USFWS) as needed. The BLM is responsible for managing the habitat that supports fish and wildlife, while CDFW is responsible for managing fish and wildlife species. Both agencies coordinate many of their activities to meet objectives to maintain, protect, and enhance the abundance and diversity of native fish and wildlife resources.

3.11.4 Current Conditions and Trends

Central Coast Field Office Planning Area

The current conditions and trends for game and indicator wildlife species are summarized in Table 3.11-2. More detailed information can be found in the RMP FEIS (BLM, 2006). Game populations are managed based on habitat condition and the quality of the animals being produced. Population levels are linked to a variety of factors, including vegetation quality and quantity, adequate space, shelter, cover, water distribution, and regional weather patterns and trends such as prolonged drought.

RTE plant and wildlife species are addressed in Section 3.12 (Special Status Species) of this document.

Table 3.11-2. Habitat Conditions and Population Trends for Key Game and Indicator Species in the Planning Area

Species	Habitat Condition	Population Trend
California mule deer Columbian black-tailed deer	Poor to good,[1-4] highly variable throughout planning area	Stable to declining
Tule elk	Poor to good,[1-4] highly variable throughout planning area	Increasing since the 1970s

Table 3.11-2. Habitat Conditions and Population Trends for Key Game and Indicator Species in the Planning Area

Species	Habitat Condition	Population Trend
Wild horse and burro	Not applicable	No herd units and no wild free-roaming horses and burros within the Planning Area
Wild pig	Poor to good[1-4], highly variable throughout planning area	Increasing and expanding
Wild turkey	Fair[1]	Increasing
Mountain lion	Fair[2,3]	Increasing
Upland game birds – California quail and chukar	Good[1]	Wide annual fluctuations, primarily due to timing and amount of rainfall
Small game, nongame, and fur-bearing mammals	Good[1,4]	Most species stable to increasing; badger decreasing

Basis of habitat condition assessment:
1 - Vegetation resource condition
2 - Development/density of intrusions
3 - Competition with other resources
4 - as reflected by population levels.

Fisheries

The coastal and inland drainages, watersheds, and small streams and rivers within the Planning Area support cool and warm water fisheries. Cold water fisheries include the coastal drainages in coastal Santa Cruz County; Molino, Ferrari, San Vicente, Liddell, Yellow Bank, and Laguna Creeks in the Central Coast Management Area; and "Y" creeks. Each of these waters supports or has the potential to support coastal rainbow trout and steelhead and coho salmon fisheries. Warm water fisheries include the San Benito River and Laguna and Warthan Creeks.

All waters in the Planning Area are managed as wild fisheries, maintained by natural recruitment rather than stocking. With the exception of the coastal rainbow trout (*Oncorhynchus mykiss irideus*), the native fish species that occur within the Planning Area are considered nongame species. RTE fish species are addressed in Section 3.12 (Special Status Species) of this document.

Birds

A wide diversity of bird life is found throughout the CCFO Planning Area, including raptors, shorebirds, songbirds, and many others. Many of these species nest within BLM managed lands within the CCFO Planning Area, while others may overwinter in the area, or be present seasonally, during migration. Most of these birds have no special conservation status (see Section 3.12 for special status species), but most birds are protected under State and Federal statutes; see Section 3.11.2. With the exception of a few non-native birds such as European starling, the take of any birds or active bird nests or young is regulated by these statutes.

Wildlife Movement and Biological Connectivity

Within the Planning Area, areas of habitat may be fragmented or isolated by development. Fragmentation and isolation of natural habitat may cause loss of native species diversity. Fish and wildlife movement among habitat areas is important to long-term genetic variation and demography. In the short term, fish and wildlife movement may also be important to individual animals' ability to occupy their home ranges, if their ranges extend across a potential movement barrier. These considerations are especially important for rare, threatened, or endangered species, and wide-ranging species such as large mammals, which exist in low population densities.

In landscapes where native habitats exist as partially isolated patches surrounded by other land uses, planning for fish and wildlife movement generally focuses on local "wildlife corridors" to provide animals with access routes among habitat patches. In largely undeveloped areas, fish and wildlife habitat is available in extensive open space areas throughout the region, but specific land uses or linear barriers may impede or prevent movement. In these landscapes, fish and wildlife movement planning focuses on sites where animals can cross linear barriers, but may not emphasize corridors among habitat areas.

Leases Subject to Settlement Agreement

Habitat condition and population trends for key game and indicator species on the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be expected to be generally similar to those for the remainder of the Planning Area. The vegetation for these leases is described generally in Section 3.10.4. Field surveys would be required to provide more detailed information.

3.12 Biological Resources – Special Status Species

3.12.1 Introduction

The RMP FEIS (BLM, 2006) describes the special status species that occur or may occur within the Planning Area. Unless otherwise cited, the information below is summarized from the RMP FEIS (BLM, 2006) and has been updated as needed.

Special status species are those with populations that have declined to the point of substantial Federal or State agency concern. BLM considers special status species to include the designations listed in Table 3.12-1.

Table 3.12-1. Definitions of Special Status Species

Species Designation	Agency	Definition
Federal Endangered	USFWS	A species that is in danger of extinction throughout all or a significant portion of its range.
Federal Threatened	USFWS	A species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
Federal Candidate	USFWS	A species the USFWS has designated as a candidate for listing under Section 4 of the ESA, published in its annual candidate review, and defined as a species that has sufficient information on its biological status and threats to propose it as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
Federal Proposed	USFWS	A species that the USFWS has proposed for listing under Section 4 of the ESA, by publishing a Proposed Rule in the Federal Register.
Bald and Golden Eagle Protection Act	USFWS	Prohibits take of bald and golden eagles without a permit issued by the Secretary of the Interior.
Birds of Conservation Concern	USFWS	The migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities.
Species of Concern	USFWS	Species of Concern is an informal term that refers to species that are declining or appear to be in need of conservation actions. Species of Concern receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species. The Sacramento USFWS Office does not maintain a Species of Concern list. However, the RMP FEIS (BLM, 2006) listed several species with this designation, and it has been retained here for consistency with that document.
Marine Mammal Protection Act	NOAA	Prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

Table 3.12-1. Definitions of Special Status Species

Species Designation	Agency	Definition
BLM Sensitive Species	BLM	BLM sensitive species are designated by the BLM California State Director in cooperation with the CDFW, as species that meet one or more of the following criteria: ▪ Could become endangered in or extirpated from a state or within a significant portion of their distribution; ▪ Status is under review by the USFWS or NMFS; that are undergoing or are predicted to undergo significant downward trends in habitat capability that would reduce their distribution; ▪ Populations or densities are declining significantly or that are predicted to decline significantly such that it becomes necessary to designate their Federal status as listed, proposed, or candidate or to designate their State status as listed; Typically have small and widely dispersed populations; Inhabit ecological refugia or other specialized or unique habitats; State listed, but that may be better conserved under BLM sensitive species status. BLM sensitive species also include CRPR 1B plant species (see below) that are not federally listed or proposed for listing.
State Endangered	CDFW	A species that is in serious danger of becoming extinct throughout all or a significant portion of its range due to one or more causes, including loss or change in habitat, overexploitation, predation, competition, or disease.
State Threatened	CDFW	A species that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts.
State Candidate	CDFW	A species that is under review by the CDFW for addition to the threatened or endangered species lists, on direction from the California Fish and Game Commission. Take of CESA candidate species is prohibited unless authorized by CDFW under Fish and Game Code Section 2081.
Fully Protected	CDFW	Animal species fully protected under the California Fish and Game Code. The CDFW may not issue take authorization except for scientific purposes or under the terms of a natural community conservation plan (NCCP).
Protected furbearers	CDFW	Applies to fisher, marten, river otter, desert kit fox, and red fox.
Species of Special Concern	CDFW	A species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria: ▪ Is extirpated from the State or, in the case of birds, from its primary seasonal or breeding role; ▪ Is on the Federal, but not State list, of threatened or endangered species; ▪ Meets the State definition of threatened or endangered but has not formally been listed; ▪ Is experiencing or formerly experienced serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; or ▪ Has naturally small populations exhibiting high susceptibility to risk from any factor(s) that, if realized, could lead to declines that would qualify it for State threatened or endangered status. SSC is an administrative designation and carries no formal legal status. This designation is intended to focus attention on animals at conservation risk, to stimulate research on poorly known species, and to achieve conservation and recovery before these species meet the California Endangered Species Act (CESA) criteria for listing. California SSC are considered under the California Environmental Quality Act (CEQA) and require a discussion of impacts and appropriate mitigation to reduce impacts.

Table 3.12-1. Definitions of Special Status Species

Species Designation	Agency	Definition
Watch List	CDFW	Taxa that were previously SSCs but no longer meet SSC status, or do not meet SSC criteria, but for which there is concern and a need for additional information to clarify status.
Protected	CDFW	An animal species that is not federally or State-listed, FP, or SSC, but is protected under the California Fish and Game Code.
Special Animals	CDFW	All of the species the CNDDB is tracking, regardless of their legal or protection status. CDFW considers these species to be those of greatest conservation need.
Rare Plant	CDFW	Plants designated by the State Fish and Game Commission as rare and protected under the Native Plants Protection Act.
CRPR 1A	CDFW	Plants presumed to be extinct in California.
CRPR 1B	CDFW	Plants rare or endangered in California and elsewhere.
CRPR 2	CDFW	Plants rare or endangered in California, but more common elsewhere.
CRPR 3	CDFW	Plants about which more information is needed – a review list.
CRPR 4	CDFW	Plants of limited distribution – a watch list.

Source: BLM, 2006, 2012, 2013; CDFW, 2015a; CNPS, 2015b; NOAA Fisheries, 2014; USFWS, 2012a, 2012b, 2014.
CRPR = California Rare Plant Rank.

The USFWS officially designates critical habitat under the ESA. Critical habitat is a designation that indicates areas that have the physical and biological features believed to be essential to the conservation of the species and may require special management considerations or protection. A critical habitat designation does not necessarily restrict future development. Only projects that have a Federal nexus (e.g., Federal permitting, licensing, or funding) and are likely to impact the critical habitat will be subject to ESA review. An affected project may be able to proceed if it can be amended to avoid or mitigate adverse effects to the critical habitat (USFWS, 2015).

The ESA mandates that all Federal agencies use their authorities to further the purposes of the ESA by carrying out programs for conserving endangered and threatened species. The ESA also requires a Federal agency to ensure that any action it authorizes, funds, or implements is not likely to jeopardize the continued existence of any endangered or threatened species or to destroy or adversely modify designated critical habitat. BLM policy is to conserve federally listed species and the ecosystems on which they depend. It is also BLM policy to ensure that BLM actions are consistent with the conservation needs of all special status species and not to contribute to a need for ESA listing of any special status species.

3.12.2 Regulatory Framework

There are several Federal and State directives that guide BLM management of special status plant and wildlife resources and their habitat. In addition to those listed in Section 3.10.2 and 3.11.2, these include:

Federal Laws and Regulations

Endangered Species Act (16 USC Sections 1531–1544). BLM Handbook H-6840. The Endangered Species Act (ESA) establishes legal requirements for the conservation of endangered and threatened species and the ecosystems upon which they depend. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial species, and by the National Marine Fisheries Service (NMFS) for marine species and anadromous fish. Under the ESA, the USFWS or NMFS may designate critical habitat for listed species. Section 7 of the ESA requires Federal agencies to consult with USFWS or NMFS to ensure that their actions are not likely to jeopardize listed threatened or endangered species, or cause

destruction or adverse modification of critical habitat. Section 10 of the ESA requires similar consultation for non-Federal applicants.

Bald and Golden Eagle Protection Act (16 USC Section 668). The Bald and Golden Eagle Protection Act (BGEPA) prohibits the take, possession, and commerce of bald eagles and golden eagles. Under the BGEPA and subsequent rules published by the USFWS, "take" may include actions that injure an eagle, or affect reproductive success (productivity) by substantially interfering with normal behavior or causing nest abandonment. The USFWS can authorize incidental take of bald and golden eagles for otherwise lawful activities.

State Laws and Regulations

California Endangered Species Act (Fish and Game Code Section 2050 et seq.). The California Endangered Species Act (CESA) prohibits take of State-listed threatened or endangered species, or candidates for listing, except as authorized by CDFW. Authorization may be issued as an Incidental Take Permit or, for species listed under both CESA and the Federal ESA, through a Consistency Determination with the Federal incidental take authorization.

Fully Protected Designations (Fish and Game Code Sections 3511, 4700, 5050, and 5515). The California Fish and Game Code designates 36 fish and wildlife species as "fully protected" from take, including hunting, harvesting, and other activities. The CDFW may only authorize take of designated fully protected species through a natural community conservation plan (NCCP) or for necessary scientific research.

Protected Furbearers (California Code of Regulations Title 14 Section 460). Title 14 specifies that "[f]isher, marten, river otter, desert kit fox and red fox may not be taken at any time." The CDFW may permit capture or handing of these species for scientific research, but does not issue Incidental Take Permits for other purposes.

Native Plant Protection Act (Fish and Game Code Sections 1900–1913). Prior to enactment of CESA and the Federal ESA, California adopted the Native Plant Protection Act (NPPA). CESA (above) generally replaces the NPPA for plants originally listed as endangered under the NPPA. However, plants originally listed as rare retain that designation, and take is regulated under provisions of the NPPA. The California Fish and Game Commission has adopted revisions to the NPPA allowing CDFW to issue incidental take authorization for listed rare plants, effective January 1, 2015. The BLM designates rare plants State-listed under the NPPA as BLM sensitive species.

3.12.3 Regional Setting

The BLM has completed or is in the process of identifying areas of ecological importance, designating priority species and habitats, and identifying restoration strategies, opportunities, and management decisions to protect or prevent avoidable loss of habitat supporting special status species within each of the Management Areas.

The BLM involves regulatory agencies in the planning process via Memoranda of Agreement (MOAs) and Memoranda of Understanding (MOUs). In addition, consultation with the USFWS and NOAA Fisheries is required by the Endangered Species Act for Federal actions that may affect listed species and designated critical habitat. The consultation process ensures that actions taken are not likely to jeopardize the continued existence of any threatened or endangered species or their critical habitat.

3.12.4 Current Conditions and Trends

Central Coast Field Office Planning Area

A number of special status species occur within the Planning Area. Tables 3.12-2 and 3.12-3 identify known or potential occurrences of special status species within the Planning Area. This information is based on the RMP FEIS (BLM, 2006) and current CNDDB (CDFW, 2015c) and Calflora (2015) records of species within the Planning Area.

Critical habitat for 14 animal species or DPS and 13 plant species occurs within the Planning Area. Critical habitat for six of these species includes BLM surface or split estate lands; see Table 3.12-2. Critical habitat found within the Planning Area is shown on Figure 3.12-1a and b.

Figures 3.12-2a through 2e and 3.12-3a through 3e depict special status species occurrences within the Planning Area, with federally listed species shown on Figure 3.12-2 and other special status species on 3.12-3. A brief description of many of these species can be found in Appendix E of the RMP FEIS (BLM, 2006). Note that some species occurrences may not have been documented in the CNDDB and site-specific analysis is required to determine the presence or absence of a particular species.

There are 88 federally listed or candidate species or distinct population segments (DPS) that occur within the Planning Area, including 46 plants and 42 animals. Several of these species are known to occur or are likely to occur on BLM lands; see Table 3.12-2.

There are 197 additional special status species (137 plant and 60 animal species) that occur within the Planning Area, 129 of these are designated as BLM sensitive species (100 plant and 29 animal species). Several of these species are known to occur or are likely to occur on BLM lands; see Table 3.12-3.

Federally Listed Species

Species that are federally listed, proposed for listing, or candidates for listing under the ESA are shown in Table 3.12-2, along with current conservation status, presence of designated critical habitat within the Planning Area (on BLM surface, split estate, and non-BLM lands), and known occurrence within the Planning Area (on BLM surface, split estate, and non-BLM lands). A brief description of many of these species can be found in Appendix E of the RMP FEIS (BLM, 2006).

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat			Occurrence
		BLM Surface	Split Estate	Non-BLM	
INVERTEBRATES: CRUSTACEANS					
Conservancy fairy shrimp *Branchinecta conservatio*	Fed: END BLM: none CA: SA				Non-BLM land May occur area-wide
Longhorn fairy shrimp *Branchinecta longiantenna*	Fed: END BLM: none CA: SA			x	Non-BLM land San Joaquin Management Area May occur area-wide
Vernal pool fairy shrimp *Branchinecta lynchi*	Fed: THR BLM: none CA: SA	x	x	x	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Vernal pool tadpole shrimp *Lepidurus packardi*	Fed: END BLM: none CA: SA			x	Non-BLM land San Joaquin Management Area

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
INVERTEBRATES: INSECTS					
Bay checkerspot butterfly *Euphydryas editha bayensis*	Fed: THR BLM: none CA: SA			x	Split estate, non-BLM land Central Coast, Salinas, and San Joaquin Management Areas
Callippe silverspot butterfly *Speyeria callippe callippe*	Fed: END BLM: none CA: SA				Non-BLM land San Joaquin Management Area
Mission blue butterfly *Plebejus icarioides missionensis*	Fed: END BLM: none CA: SA				Non-BLM land San Joaquin Management Area
Mount Hermon June beetle *Polyphylla barbata*	Fed: END BLM: none CA: SA				Non-BLM land Central Coast Management Area
Myrtle's silverspot butterfly *Speyeria zerene myrtleae*	Fed: END BLM: none CA: SA				Non-BLM land San Joaquin Management Area
Ohlone tiger beetle *Cicindela ohlone*	Fed: END BLM: none CA: SA				Non-BLM land Central Coast Management Area
San Bruno elfin butterfly *Callophrys [Incisalia] mossii bayensis*	Fed: END BLM: none CA: SA				Split estate, non-BLM land San Joaquin Management Area
Smith's blue butterfly *Euphilotes enoptes smithi*	Fed: END BLM: none CA: SA				BLM surface, split estate, non-BLM land Central Coast and Salinas Management Areas
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	Fed: THR BLM: none CA: SA				Non-BLM land San Joaquin Management Area
Zayante band-winged grasshopper *Trimerotropis infantilis*	Fed: END BLM: none CA: SA			x	Non-BLM land Central Coast Management Area
FISH					
Coho salmon – central coast ESU *Oncorhynchus kisutch* Note: Federal listing limited to naturally spawning populations between Punta Gorda, Humboldt Co. and San Lorenzo River, Santa Cruz Co.	Fed: END BLM: none CA: END				BLM surface, split estate, non-BLM land Central Coast Management Area
Delta smelt *Hypomesus transpacificus*	Fed: THR BLM: none CA: END	x	x		Non-BLM land San Joaquin Management Area
Longfin smelt *Spirinchus thaleichthys* Note: Federal Candidate status is for the San Francisco Bay-Delta DPS	Fed: Cand BLM: none CA: THR, SSC				Non-BLM land San Joaquin Management Area
Steelhead – central coast DPS *Oncorhynchus mykiss irideus*	Fed: THR BLM: none CA: SA			x	BLM surface, split estate, non-BLM land Central Coast, Salinas, and San Joaquin Management Areas

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
Steelhead – south/central coast DPS *Oncorhynchus mykiss irideus*	Fed: THR BLM: none CA: SSC			x	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Tidewater goby *Eucyclogobius newberryi*	Fed: END BLM: none CA: SSC			x	Non-BLM land Central Coast and San Joaquin Management Areas
AMPHIBIANS					
Arroyo toad *Anaxyrus californicus*	Fed: END BLM: none CA: SSC				Non-BLM land Salinas Management Area
California red-legged frog *Rana aurora draytonii*	Fed: THR BLM: none CA: SSC	x	x	x	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
California tiger salamander (Central Valley Distinct Population Segment) *Ambystoma californiense*	Fed: THR BLM: none CA: THR, SSC	x	x	x	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Santa Cruz long-toed salamander *Ambystoma macrodactylum croceum*	Fed: END BLM: none CA: END, FP				Non-BLM land Central Coast Management Area
REPTILES					
Alameda whipsnake (striped racer) *Masticophis lateralis euryxanthus*	Fed: THR BLM: none CA: THR		x	x	Split estate, non-BLM land San Joaquin Management Area
Blunt-nosed leopard lizard *Gambelia sila*	Fed: END BLM: none CA: END, FP				BLM surface, split estate, non-BLM land San Joaquin Management Area
Giant garter snake *Thamnophis gigas*	Fed: THR BLM: none CA: THR				Non-BLM land San Joaquin Management Area
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	Fed: END BLM: none CA: END, FP				Split estate, non-BLM land Central Coast and San Joaquin Management Areas
BIRDS					
California condor *Gymnogyps californianus*	Fed: END BLM: none CA: END, FP				Split estate, non-BLM land San Benito Management Area
California least tern *Sternula antillarum browni*	Fed: END BLM: none CA: END, FP				Non-BLM land San Joaquin Management Area
Least Bell's vireo *Vireo bellii pusillus*	Fed: END BLM: none CA: END				Split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
Marbled murrelet *Brachyramphus marmoratus*	Fed: THR BLM: none CA: END		x	x	Non-BLM land Central Coast Management Area
Ridgway's (California clapper) rail *Rallus longirostris obsoletus*	Fed: END BLM: none CA: END, FP				Non-BLM land Central Coast and San Joaquin Management Areas
Western snowy plover *Charadrius alexandrinus nivosus*	Fed: THR, BCC BLM: none CA: SSC			x	BLM surface, non-BLM land Central Coast and San Joaquin Management Areas
Western yellow-billed cuckoo *Coccyzus americanus occidentales*	Fed: THR, BCC BLM: S CA: END				Non-BLM land San Benito Management Area
MAMMALS					
Giant kangaroo rat *Dipodomys ingens*	Fed: END BLM: none CA: END				BLM surface, split estate, non-BLM land San Joaquin Management Area
Guadalupe fur seal *Arctocephalus townsendi*	Fed: THR, MMPA BLM: none CA: THR, FP				Unknown occurrence in the Planning Area, known from Farallon Islands in San Francisco County
Salt-marsh harvest mouse *Reithrodontomys raviventris*	Fed: END BLM: none CA: END, FP				Non-BLM land San Joaquin Management Area
San Joaquin kit fox *Vulpes macrotis mutica*	Fed: END BLM: none CA: THR				BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Southern sea otter *Enhydra lutris nereis*	Fed: THR, MMPA BLM: none CA: FP				Unknown occurrence in the Planning Area, species is known from Marin County
Tipton kangaroo rat *Dipodomys nitratoides nitratoides*	Fed: END BLM: none CA: END				Non-BLM land San Joaquin Management Area
PLANTS					
Antioch Dunes evening-primrose *Oenothera deltoides ssp. howellii*	Fed: END BLM: none CA: END, CRPR 1B.1			x	Non-BLM land San Joaquin Management Area
Beach layia *Layia carnosa*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
Ben Lomond spineflower *Chorizanthe pungens var. hartwegiana*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land Central Coast Management Area
Butano Ridge cypress *Hesperocyparis abramsiana var. butanoensis*	Fed: END BLM: none CA: END, CRPR 1B.2				Split estate, non-BLM land Central Coast Management Area
California jewelflower *Caulanthus californicus*	Fed: END BLM: none CA: END, CRPR 1B.1				BLM surface, split estate, non-BLM land San Joaquin Management Area

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
California seablite *Suaeda californica*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land San Joaquin Management Area
Coastal dunes milk-vetch *Astragalus tener var. titi*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
Contra Costa goldfields *Lasthenia conjugens*	Fed: END BLM: none CA: CRPR 1B.1			x	BLM surface, non-BLM land Central Coast and San Joaquin Management Areas
Contra Costa wallflower *Erysimum capitatum ssp. angustatum*	Fed: END BLM: none CA: END, CRPR 1B.1			x	Non-BLM land San Joaquin Management Area
Coyote ceanothus *Ceanothus ferrisiae*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Crystal Springs fountain thistle *Cirsium fontinale var. fontinale*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land San Joaquin Management Area
Franciscan manzanita *Arctostaphylos franciscana*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land San Joaquin Management Area
Gowen cypress *Hesperocyparis (Cupressus) goveniana*	Fed: THR BLM: none CA: CRPR 1B.2				Non-BLM land Central Coast Management Area
Hickman's cinquefoil *Potentilla hickmanii*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Large-flowered fiddleneck *Amsinckia grandiflora*	Fed: END BLM: none CA: END, CRPR 1B.1		x		Split estate, non-BLM land San Joaquin Management Area
Marin western (dwarf) flax *Hesperolinon congestum*	Fed: THR BLM: none CA: THR, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Marsh sandwort *Arenaria paludicola*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Menzies's wallflower *Erysimum menziesii*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
Metcalf Canyon jewel-flower *Streptanthus albidus ssp. albidus*	Fed: END BLM: S CA: CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Mexican flannelbush *Fremontodendron mexicanum*	Fed: END BLM: none CA: Rare, CRPR 1B.1				Non-BLM land Salinas Management Area
Monterey clover *Trifolium trichocalyx*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
Monterey spineflower *Chorizanthe pungens var. pungens*	Fed: THR BLM: none CA: CRPR 1B.2			x	BLM surface, non-BLM land Central Coast and Salinas Management Areas

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
Pallid manzanita *Arctostaphylos pallida*	Fed: THR BLM: none CA: END, CRPR 1B.1				Non-BLM land San Joaquin Management Area
Palmate-bracted salty bird's-beak *Chloropyron palmatum* *(Cordylanthus palmatus)*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land San Joaquin Management Area
Presidio clarkia *Clarkia franciscana*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land San Joaquin Management Area
Presidio (San Francisco) manzanita *Arctostaphylos montana ssp. ravenii*	Fed: END BLM: none CA: END, CRPR 1B.1			x	Non-BLM land San Joaquin Management Area
Robust spineflower *Chorizanthe robusta var. robusta*	Fed: END BLM: S CA: CRPR 1B.1			x	Non-BLM land Salinas, Central Coast, and San Joaquin Management Areas
San Benito evening-primrose *Camissonia benitensis*	Fed: THR BLM: none CA: CRPR 1B.1				BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Sand gilia (Monterey gilia) *Gilia tenuiflora ssp. arenaria*	Fed: END BLM: none CA: THR, CRPR 1B.2				BLM surface, non-BLM land Central Coast Management Area
San Francisco lessingia *Lessingia germanorum*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land San Joaquin Management Area
San Joaquin woollythreads *Monolopia congdonii*	Fed: END BLM: none CA: CRPR 1B.2				BLM surface, split estate, non-BLM land San Joaquin Management Area
San Mateo thorn-mint *Acanthomintha duttonii*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
San Mateo woolly sunflower *Eriophyllum latilobum*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Santa Clara Valley dudleya *Dudleya abramsii ssp. setchellii*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Santa Cruz cypress *Hesperocyparis (Cupressus) abramsiana var. abramsiana*	Fed: END BLM: none CA: END, CRPR 1B.2				Non-BLM land Central Coast Management Area
Santa Cruz tarplant *Holocarpha macradenia*	Fed: THR BLM: none CA: END, CRPR 1B.1			x	Non-BLM land Central Coast and San Joaquin Management Areas
Santa Cruz wallflower *Erysimum teretifolium*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
Santa Lucia purple amole *Chlorogalum purpureum var. purpureum*	Fed: THR BLM: none CA: CRPR 1B.1			x	Split estate, non-BLM land Salinas Management Area

Table 3.12-2. Federally Listed Species Present in the Planning Area

Common name *Scientific name*	Status	Critical Habitat: BLM Surface	Critical Habitat: Split Estate	Critical Habitat: Non-BLM	Occurrence
Scott's Valley polygonum *Polygonum hickmanii*	Fed: END BLM: none CA: END, CRPR 1B.1			x	Non-BLM land Central Coast Management Area
Scott's Valley spineflower *Chorizanthe robusta var. hartwegii*	Fed: END BLM: none CA: CRPR 1B.1			x	Non-BLM land Central Coast Management Area
Showy rancheria clover *Trifolium amoenum*	Fed: END BLM: none CA: CRPR 1B.1				Non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
Soft salty bird's-beak *Chloropyron (Cordylanthus) molle ssp. molle*	Fed: END BLM: none CA: Rare, CRPR 1B.2			x	Non-BLM land San Joaquin Management Area
Tiburon paintbrush *Castilleja affinis var. neglecta*	Fed: END BLM: none CA: THR, CRPR 1B.2				Non-BLM land San Joaquin Management Area
Tidestrom's lupine *Lupinus tidestromii*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast Management Area
White-rayed pentachaeta *Pentachaeta bellidiflora*	Fed: END BLM: none CA: END, CRPR 1B.1				Non-BLM land Central Coast and San Joaquin Management Areas
Yadon's rein orchid *Piperia yadonii*	Fed: END BLM: none CA: CRPR 1B.1			x	Non-BLM land Central Coast and Salinas Management Areas

Sources: BLM (2006), CNPS (2015a), and CDFW (2015a, 2015b, 2015c), with additional information from Calflora (2015). Occurrence within Planning Area is based on CDFW (2015c), Calflora (2015), BLM (2006), and updates from BLM staff.

Status Codes

U.S. Fish and Wildlife Service (FED) Designations:

END: Federally listed, endangered.
THR: Federally listed, threatened.
Cand: Candidate for listing.
Delisted: Removed from Federal listing.
BGEPA: Bald and Golden Eagle Protection Act.
BCC: Bird of Conservation Concern.
SC: Species of Concern. The Sacramento USFWS Office does not maintain a Species of Concern list. However, the RMP FEIS (BLM, 2006) listed several species with this designation and it has been retained here for consistency with that document.

National Oceanic and Atmospheric Administration Fisheries (FED) Designations:

MMPA: Marine Mammal Protection Act.

Bureau of Land Management (BLM) Designations

S: BLM sensitive species. BLM sensitive species status based on BLM, 2010, 2013a, 2013b; CDFW, 2015a, 2015b.

California Department of Fish and Wildlife (CA) Designations:

END: State listed, endangered.
THR: State listed, threatened.
Cand: Candidate for listing.
Delisted: Removed from State listing.
CSC: Species of Special Concern: Considered vulnerable to extinction due to declining numbers, limited geographic ranges, or ongoing threats.
FP: Fully protected. May not be taken or possessed without permit from CDFW.
SA: Special Animal: An animal species that is tracked in the CNDDB, but has no other status at the State or Federal level.
WL: Watch list.
PFM: Protected fur-bearing mammal.
Rare: Rare plant listed under the Native Plants Protection Act.

California Rare Plant Rank (CRPR) designation

1A	Plants presumed extinct in California.
1B	Plants rare, threatened, or endangered in California and elsewhere.
2B	Plants rare, threatened, or endangered in California, but more common elsewhere.
3	Plants about which we need more information – a review list.
4	Plants of limited distribution – a watch list.
.1	Seriously threatened in California (high degree/immediacy of threat).
.2	Fairly threatened in California (moderate degree/immediacy of threat).
.3	Not very threatened in California (low degree/immediacy of threats or no current threats known).

Other Special Status Species

Table 3.12-3 provides current conservation status and occurrence within the Planning Area for special status species that are not federally listed. A brief description of many of these species can be found in Appendix E of the RMP FEIS (BLM, 2006).

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
INVERTEBRATES: CRUSTACEANS		
Western fairy shrimp (California linderiella) *Linderiella occidentalis*	Fed: SC BLM: none CA: SA	BLM surface, non-BLM land May occur area-wide
INVERTEBRATES: INSECTS		
Ciervo aegialian scarab beetle *Aegialia concinna*	Fed: SC BLM: S CA: SA	BLM surface, non-BLM land San Joaquin Management Area
Doyen's dune weevil *Trigonoscuta sp.*	Fed: SC BLM: none CA: SA	Non-BLM land Central Coast and San Joaquin Management Area
Molstan blister beetle *Lytta molesta*	Fed: SC BLM: none CA: SA	Split estate, non-BLM land San Joaquin Management Area
Monarch – California overwintering population *Danaus plexippus*	Fed: none BLM: none CA: SA	Split estate, non-BLM land Central Coast, Salinas, and San Joaquin Management Areas
Morrison's blister beetle *Lytta morrisoni*	Fed: SC BLM: none CA: SA	BLM surface, split estate, non-BLM land San Joaquin Management Area
San Joaquin dune beetle *Coelus gracilis*	Fed: SC BLM: S CA: SA	BLM surface, split estate, non-BLM land San Joaquin Management Area
AMPHIBIANS		
Foothill yellow-legged frog *Rana boylii*	Fed: SC BLM: S CA: SSC	BLM surface, split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
Western spadefoot toad *Spea hammondii*	Fed: SC BLM: S CA: SSC	Split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
REPTILES		
Black (California) legless lizard *Anniella pulchra nigra*	Fed: none BLM: none CA: SSC	Split estate, non-BLM land Salinas and Central Coast Management Areas

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Coast horned lizard *Phrynosoma blainvillii*	Fed: none BLM: S CA: SSC	BLM surface, split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
San Joaquin whipsnake *Masticophis flagellum ruddocki*	Fed: none BLM: none CA: SSC	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Silvery legless lizard *Anniella pulchra pulchra*	Fed: none BLM: none CA: SSC	BLM surface, non-BLM land Central Coast, San Benito, Salinas, and San Joaquin Management Areas
Two-striped garter snake *Thamnophis hammondii*	Fed: none BLM: S CA: SSC	BLM surface, non-BLM land Central Coast, San Benito, Salinas, and San Joaquin Management Areas
Western pond turtle *Emys marmorata*	Fed: none BLM: S CA: SSC	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Joaquin, and San Benito Management Areas
BIRDS		
Alameda song sparrow *Melospiza melodia pusillula*	Fed: BCC BLM: none CA: SSC	Split estate, non-BLM land San Joaquin Management Area
American peregrine falcon *Falco peregrinus anatum*	Fed: Delisted, BCC BLM: none CA: Delisted, FP	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Bald eagle *Haliaeetus leucocephalus*	Fed: Delisted, BGEPA, BCC BLM: S CA: END, FP	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Bank swallow *Riparia riparia*	Fed: none BLM: S CA: THR	Split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Bell's sage sparrow *Artemisiospiza belli ssp. belli*	Fed: BCC BLM: none CA: WL	BLM surface, split estate, non-BLM land San Benito Management Area
Burrowing owl *Athene cunicularia*	Fed: BCC BLM: S CA: SSC	BLM surface, split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
California black rail *Laterallus jamaicensis coturniculus*	Fed: BCC BLM: S CA: THR, FP	Non-BLM land Central Coast and San Joaquin Management Areas
California brown pelican *Pelecanus occidentalis californicus*	Fed: Delisted BLM: S CA: Delisted, FP	Non-BLM land Central Coast Management Area
Ferruginous hawk *Buteo regalis*	Fed: BCC BLM: none CA: WL	Split estate, non-BLM land Central Coast and San Joaquin Management Areas Potential to occur area-wide
Golden eagle *Aquila chrysaetos*	Fed: BGEPA, BCC BLM: S CA: WL, FP	Split estate, non-BLM land May occur area-wide

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Grasshopper sparrow *Ammodramus savannarum*	Fed: none BLM: none CA: SSC	Non-BLM land Central Coast Management Area
LeConte's thrasher *Toxostoma lecontei*	Fed: BCC BLM: S CA: SSC BLM S and CA SSC status only for San Joaquin ssp. *T.l. macmillanorum*	Non-BLM land San Joaquin Management Area
Loggerhead shrike *Lanius ludovicianus*	Fed: BCC BLM: none CA: SSC	Non-BLM land San Joaquin Management Area Potential to occur area-wide
Long-eared owl *Asio otus*	Fed: none BLM: none CA: SSC	Non-BLM land Central Coast, San Benito, and San Joaquin Management Areas Potential to occur area-wide
Mountain plover *Charadrius montanus*	Fed: BCC BLM: S CA: SSC	Non-BLM land San Joaquin Management Area
Northern harrier *Circus cyaneus*	Fed: none BLM: none CA: SSC	Split estate, non-BLM land Salinas, San Benito, San Joaquin Management Areas Potential to occur area-wide
Osprey *Pandion haliaetus*	Fed: none BLM: none CA: WL	Non-BLM land Central Coast Management Area Potential to occur area-wide
Prairie falcon *Falco mexicanus*	Fed: BCC BLM: none CA: WL	BLM surface, split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
Rhinoceros auklet *Cerorhinca monocerata*	Fed: none BLM: none CA: WL	Non-BLM land Central Coast and Salinas Management Areas
Sharp-shinned hawk *Accipiter striatus*	Fed: none BLM: none CA: WL	Non-BLM land San Benito and San Joaquin Management Areas Potential to occur area-wide
Short-eared owl *Asio flammeus*	Fed: none BLM: none CA: SSC	Non-BLM land Central Coast, Salinas, and San Joaquin Management Areas
Swainson's hawk *Buteo swainsoni*	Fed: BCC BLM: S CA: THR	Split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
Tri-colored blackbird *Agelaius tricolor*	Fed: BCC BLM: S CA: END, SSC	Split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas Potential to occur area-wide
White-tailed kite *Elanus leucurus*	Fed: none BLM: S CA: FP	Split estate, non-BLM land Central Coast, San Benito, and San Joaquin Management Areas
Willow flycatcher *Empidonax traillii*	Fed: BCC BLM: none CA: END	Non-BLM land Potential to occur area-wide

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Yellow-breasted chat *Icteria virens*	Fed: none BLM: none CA: SSC	Non-BLM land San Benito Management Area Potential to occur area-wide
Yellow warbler *Setophaga (Dendroica) petechia*	Fed: BCC BLM: none CA: SSC	Non-BLM land Salinas and San Joaquin Management Areas Potential to occur area-wide
MAMMALS		
American badger *Taxidea taxus*	Fed: none BLM: none CA: SSC	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Big-eared kangaroo rat *Dipodomys venustus elephantinus*	Fed: none BLM: none CA: SSC	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Fringed myotis *Myotis thysanoides*	Fed: none BLM: S CA: SA	Non-BLM land San Benito and San Joaquin Management Areas Potential to occur area-wide
Hoary bat *Lasiurus cinereus*	Fed: none BLM: none CA: SA	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Long-eared myotis *Myotis evotis*	Fed: none BLM: S CA: SA	Non-BLM land San Benito and San Joaquin Management Areas Potential to occur area-wide
Monterey dusky-footed woodrat *Neotoma macrotis luciana*	Fed: none BLM: none CA: SSC	BLM surface, split estate, non-BLM land Salinas and San Benito Management Areas
Northern elephant seal *Mirounga angustirostris*	Fed: MMPA BLM: none CA: FP	Unknown occurrence in the Planning Area, species is not tracked by CNDDB but range includes the central coast
Pallid bat *Antrozous pallidus*	Fed: none BLM: S CA: SSC	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Ringtail (ring-tailed cat) *Bassariscus astutus*	Fed: none BLM: none CA: FP	Unknown occurrence in the Planning Area, species is not tracked by CNDDB but range includes most of California Potential to occur area-wide
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	Fed: none BLM: none CA: SSC	Non-BLM land Central Coast and San Joaquin Management Areas
San Joaquin (Nelson's) antelope squirrel *Ammospermophilus nelsoni*	Fed: SC BLM: S CA: THR	BLM surface, split estate, non-BLM land San Joaquin and San Benito Management Areas
San Joaquin pocket mouse *Perognathus inornatus inornatus*	Fed: none BLM: S CA: SA	BLM surface, split estate, non-BLM land San Joaquin Management Area
Short-nosed kangaroo rat *Dipodomys nitratoides brevinasus*	Fed: none BLM: S CA: SSC	BLM surface, non-BLM land San Joaquin Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Townsend's big-eared bat *Corynorhinus townsendii*	Fed: none BLM: S CA: Cand, SSC	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas
Tulare grasshopper mouse *Onychomys torridus tularensis*	Fed: none BLM: S CA: SSC	BLM surface, split estate, non-BLM land San Joaquin and San Benito Management Areas
Western mastiff bat *Eumops perotis californicus*	Fed: none BLM: S CA: SSC	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas Potential to occur area-wide
Western small-footed myotis *Myotis ciliolabrum*	Fed: none BLM: S CA: SA	Non-BLM land San Benito Management Area Potential to occur area-wide
Yuma myotis *Myotis yumanensis*	Fed: none BLM: S CA: SA	Non-BLM land Central Coast, San Benito, and San Joaquin Management Areas Potential to occur area-wide
PLANTS		
Abbott's bush-mallow *Malacothamnus abbottii*	Fed: none BLM: S CA: CRPR 1B.1	Split estate, non-BLM land Salinas Management Area
Adobe sanicle *Sanicula maritima*	Fed: none BLM: S CA: Rare, CRPR 1B.1	Non-BLM land Central Coast, Salinas, and San Joaquin Management Areas
Anderson's manzanita *Arctostaphylos andersonii*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast Management Area
Arburua Ranch jewelflower *Streptanthus insignis ssp. lyonii*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area
Arcuate bush-mallow *Malacothamnus arcuatus*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast Management Area
Arroyo de la Cruz manzanita *Arctostaphylos cruzensis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Arroyo Seco bush mallow *Malacothamnus palmeri var. lucianus*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast and Salinas Management Areas
Bay buckwheat *Eriogonum umbellatum var. bahiiforme*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Benito and San Joaquin Management Areas
Brandegee's eriastrum *Eriastrum brandegeeae*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface San Benito Management Area
Brewer's clarkia *Clarkia breweri*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Brewer's western flax *Hesperolinon breweri*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Bristlecone fir *Abies bracteata*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land Salinas Management Area
Butterworth's buckwheat *Eriogonum butterworthianum*	Fed: none BLM: S CA: Rare, CRPR 1B.3	Non-BLM land Salinas Management Area
California androsace *Androsace elongata ssp. acuta*	Fed: none BLM: none CA: CRPR 4.2	Split estate, non-BLM land San Joaquin Management Area
Carlotta Hall's lace fern *Aspidotis carlotta-halliae*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
Carmel Valley bush mallow *Malacothamnus palmeri var. involucratus*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Central Coast and Salinas Management Areas
Carmel Valley cliffaster *Malacothrix saxatilis var. arachnoidea*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast, Salinas, and San Benito Management Areas
Chaparral harebell *Campanula exigua*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Chaparral ragwort *Senecio aphanactis*	Fed: none BLM: none CA: CRPR 2B.2	BLM surface, non-BLM land San Joaquin Management Area
Clay buckwheat *Eriogonum argillosum*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Cleveland's milk-vetch *Astragalus clevelandii*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land Clear Creek Management Area
Club-haired mariposa lily *Calochortus clavatus var. clavatus*	Fed: none BLM: none CA: CRPR 4.3	BLM surface San Joaquin Management Area
Coast wallflower *Erysimum ammophilum*	Fed: none BLM: S CA: CRPR 1B.2	Non-BLM land Central Coast Management Area
Coastal triquetrella *Triquetrella californica*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area
Congdon's tarplant *Centromadia (Hemizonia) parryi ssp. congdonii*	Fed: none BLM: S CA: CRPR 1B.1	Non-BLM land Central Coast, Salinas, and San Joaquin Management Areas
Crownscale *Atriplex coronata var. coronata*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, non-BLM land San Joaquin Management Area
Davidson's bush-mallow *Malacothamnus davidsonii*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Delicate bluecup *Githopsis tenella*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land Salinas Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Delta button-celery *Eryngium racemosum*	Fed: none BLM: S CA: END, CRPR 1B.1	Non-BLM land San Joaquin Management Area
Diablo helianthella *Helianthella castanea*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area
Diablo Range hare-leaf *Lagophylla diabolensis*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Douglas' fiddleneck *Amsinckia douglasiana*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, non-BLM land San Joaquin Management Area
Dudley's lousewort *Pedicularis dudleyi*	Fed: none BLM: S CA: Rare, CRPR 1B.2	Split estate, non-BLM land Central Coast and Salinas Management Areas
Dwarf soaproot *Chlorogalum pomeridianum var. minus*	Fed: none BLM: S CA: Rare, CRPR 1B.2	Split estate San Joaquin Management Area
Eastwood's buckwheat *Eriogonum eastwoodianum*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land Salinas and San Joaquin Management Areas
Elegant wild buckwheat *Eriogonum elegans*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land Benito Management Area
Fragrant fritillary *Fritillaria liliacea*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast and San Joaquin Management Areas
Forked fiddleneck *Amsinckia furcata*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Joaquin and San Benito Management Areas
Forked hare-leaf *Lagophylla dichotoma*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface San Benito Management Area
Gabilan Mountains manzanita *Arctostaphylos gabilanensis*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, non-BLM land Salinas Management Area
Guirado's goldenrod *Solidago guiradonis*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
Gypsum-loving larkspur *Delphinium gypsophilum*	Fed: none BLM: none CA: CRPR 3.2 for *D.g.* ssp. *parviflorum*	BLM surface, non-BLM land San Joaquin Management Area
Hall's bush-mallow *Malacothamnus hallii*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area
Hall's tarplant *Deinandra halliana*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Hardham's bedstraw *Galium hardhamiae*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land Salinas Management Area
Hardham's evening-primrose *Camissoniopsis hardhamiae*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Hernandez bluecurls *Trichostema rubisepalum*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
Hernandez spineflower *Chorizanthe biloba var. immemora*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Hickman's checkerbloom *Sidalcea hickmanii ssp. hickmanii*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land Salinas Management Area
Hooked popcornflower *Plagiobothrys uncinatus*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas and San Benito Management Areas
Hooker's manzanita *Arctostaphylos hookeri ssp. hookeri*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast Management Area
Hoover's woollystar, Hoover's eriastrum *Eriastrum hooveri*	Fed: Delisted BLM: none CA: CRPR 4.2	Non-BLM land San Joaquin Management Area
Hospital Canyon larkspur *Delphinium californicum ssp. interius*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Benito and San Joaquin Management Areas
Idria buckwheat *Eriogonum vestitum*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land San Joaquin Management Area
Indian Valley bush-mallow *Malacothamnus aboriginum*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Indian Valley spineflower *Aristocapsa insignis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Jepson's milk-vetch *Astragalus rattanii var. jepsonianus*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate Clear Creek Management Area
Jolon clarkia *Clarkia jolonensis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Jones' layia *Layia jonesii*	Fed: none BLM: S CA: CRPR 1B.2	Non-BLM land Salinas Management Area
Late-flowered mariposa-lily *Calochortus fimbriatus*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Lemmon's jewelflower *Caulanthus lemmonii*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas and San Joaquin Management Areas
Lime Ridge navarretia *Navarretia gowenii*	Fed: none BLM: S CA: CRPR 1B.1	Split estate, non-BLM land San Joaquin Management Area
Lost Hills crownscale *Atriplex coronata var. vallicola*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area
Mariposa cryptantha *Cryptantha mariposae*	Fed: none BLM: S CA: CRPR 1B.3	BLM surface Clear Creek Management Area
Marsh microseris *Microseris paludosa*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas and Central Coast Management Areas
Mason's lilaeopsis *Lilaeopsis masonii*	Fed: none BLM: S CA: Rare, CRPR 1B.1	Non-BLM land San Joaquin Management Area
Michael's rein orchid *Piperia michaelii*	Fed: none BLM: none CA: CRPR 4.2	Split estate, non-BLM land San Joaquin Management Area
Mojave spineflower *Chorizanthe spinosa*	Fed: none BLM: none CA: CRPR 4.2	BLM surface San Joaquin Management Area
Mt. Day rockcress *Boechera rubicundula*	Fed: none BLM: S CA: CRPR 1B.1	Split estate, non-BLM land San Joaquin Management Area
Mt. Diablo bird's-beak *Cordylanthus nidularius*	Fed: none BLM: S CA: Rare, CRPR 1B.1	Non-BLM land San Joaquin Management Area
Mt. Diablo buckwheat *Eriogonum truncatum*	Fed: none BLM: S CA: CRPR 1B.1	Split estate, non-BLM land San Joaquin Management Area
Mt. Diablo jewelflower *Streptanthus hispidus*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land San Joaquin Management Area
Mt. Diablo phacelia *Phacelia phacelioides*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Mt. Hamilton coreopsis *Leptosyne hamiltonii*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area
Mt. Hamilton fountain thistle *Cirsium fontinale var. campylon*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area
Mt. Hamilton jewelflower *Streptanthus callistus*	Fed: none BLM: S CA: CRPR 1B.3	Split estate, non-BLM land San Joaquin Management Area
Mt. Hamilton lomatium *Lomatium observatorium*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Munz's tidy-tips *Layia munzii*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area
Narrow-petaled rein orchid *Piperia leptopetala*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, split estate Benito Management Area
Nuttall's scrub oak *Quercus dumosa*	Fed: none BLM: S CA: Rare, CRPR 1B.1	BLM surface, split estate, non-BLM land Salinas and San Benito Management Areas
Otay manzanita *Arctostaphylos otayensis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate San Joaquin Management Area
Oval-leaved snapdragon *Antirrhinum ovatum*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Pacific Grove clover *Trifolium polyodon*	Fed: none BLM: S CA: Rare, CRPR 1B.1	Non-BLM land Central Coast Management Area
Pajaro manzanita *Arctostaphylos pajaroensis*	Fed: none BLM: S CA: CRPR 1B.1	Non-BLM land Central Coast, Salinas, and San Benito Management Areas
Pale-yellow layia *Layia heterotricha*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Panoche peppergrass *Lepidium jaredii ssp. album*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin, San Benito, and Clear Creek Management Areas
Pinnacles buckwheat *Eriogonum nortonii*	Fed: none BLM: S CA: CRPR 1B.3	BLM surface, split estate, non-BLM land Salinas and San Benito Management Areas
Point Reyes meadowfoam *Limnanthes douglasii ssp. sulphurea*	Fed: none BLM: S CA: END, CRPR 1B.2	Non-BLM land Central Coast Management Area
Prostrate vernal pool navarretia *Navarretia prostrata*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land San Benito and San Joaquin Management Areas
Protruding buckwheat *Eriogonum nudum var. indictum*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Benito, Salinas, San Joaquin, and Clear Creek Management Areas
Rayless layia *Layia discoidea*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land San Benito and Clear Creek Management Areas
Recurved larkspur *Delphinium recurvatum*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Area
Red-flowered bird's-foot-trefoil *Acmispon rubriflorus*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land San Joaquin Management Area
Rock sanicle *Sanicula saxatilis*	Fed: none BLM: S CA: Rare, CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Round-leaved filaree *California macrophylla*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Salinas milk-vetch *Astragalus macrodon*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Salinas Valley goldfields *Lasthenia leptalea*	Fed: none BLM: none CA: CRPR 4.3	Non-BLM land Salinas Management Area
San Antonio collinsia *Collinsia antonina*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas Management Area
San Benito fritillary *Fritillaria viridea*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
San Benito monardella *Monardella antonina ssp. benitensis*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
San Benito pentachaeta *Pentachaeta exilis ssp. aeolica*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Benito, Salinas, and Clear Creek Management Areas
San Benito poppy *Eschscholzia hypecoides*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, non-BLM land San Joaquin, San Benito, and Salinas Management Areas
San Benito thorn-mint *Acanthomintha obovata ssp. obovata*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Joaquin, San Benito, Salinas, and Clear Creek Management Areas
San Bruno Mountain manzanita *Arctostaphylos imbricata*	Fed: none BLM: S CA: END, CRPR 1B.1	Non-BLM land San Joaquin Management Area
San Francisco popcorn-flower *Plagiobothrys diffusus*	Fed: none BLM: S CA: END, CRPR 1B.1	Non-BLM land Central Coast and San Joaquin Management Areas
San Joaquin spearscale *Extriplex joaquinana*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Benito Management Area
San Luis Obispo sedge *Carex obispoensis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Santa Clara thorn-mint *Acanthomintha lanceolata*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Joaquin, San Benito, Salinas, and Clear Creek Management Areas
Santa Cruz clover *Trifolium buckwestiorum*	Fed: none BLM: S CA: CRPR 1B.1	Non-BLM land Central Coast Management Area
Santa Cruz Mountains beardtongue *Penstemon rattanii var. kleei*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast Management Area
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land Central Coast, Salinas, San Benito, and San Joaquin Management Areas

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Santa Lucia dwarf rush *Juncus luciensis*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas and San Benito Management Areas
Santa Lucia gooseberry *Ribes sericeum*	Fed: none BLM: none CA: CRPR 4.3	Split estate, non-BLM land Central Coast Management Area
Santa Lucia mint *Pogogyne clareana*	Fed: none BLM: S CA: END, CRPR 1B.2	Non-BLM land Salinas Management Area
Santa Lucia monkeyflower *Erythranthe hardhamiae*	Fed: none BLM: S CA: CRPR 1B.1	Split estate, non-BLM land Salinas Management Area
Seaside bird's-beak *Cordylanthus rigidus ssp. littoralis*	Fed: none BLM: S CA: END, CRPR 1B.1	Non-BLM land Central Coast Management Area
Serpentine leptosiphon *Leptosiphon (Linanthus) ambiguus*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Serpentine phlox-leaf bedstraw *Galium andrewsii ssp. gatense*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land San Joaquin, San Benito, and Salinas Management Areas
Sharsmith's harebell *Campanula sharsmithiae*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land San Joaquin Management Area
Sharsmith's onion *Allium sharsmithiae*	Fed: none BLM: S CA: CRPR 1B.3	BLM surface, split estate, non-BLM land San Joaquin Management Area
Sharsmith's western flax *Hesperolinon sharsmithiae*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area
Shining navarretia *Navarretia nigelliformis ssp. radians*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas and San Benito Management Areas
Showy golden madia *Madia radiata*	Fed: none BLM: S CA: CRPR 1B.1	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Small-flowered morning-glory *Convolvulus simulans*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
Smooth lessingia *Lessingia micradenia var. glabrata*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Central Coast and San Joaquin Management Areas
South Coast Range morning glory *Calystegia collina ssp. venusta*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, split estate, non-BLM land Salinas, San Benito, and San Joaquin Management Areas
Spring lessingia *Lessingia tenuis*	Fed: none BLM: none CA: CRPR 4.3	Split estate, non-BLM land San Joaquin Management Area

Table 3.12-3. Other Special Status Species Present in the Planning Area

Common name *Scientific name*	Status	Occurrence
Stinkbells *Fritillaria agrestis*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, split estate, non-BLM land Central Coast, San Benito, Salinas, San Joaquin, and Clear Creek Management Areas
Straight-awned spineflower *Chorizanthe rectispina*	Fed: none BLM: S CA: CRPR 1B.3	BLM surface, split estate, non-BLM land Salinas Management Area
Talus fritillary *Fritillaria falcata*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas, San Benito, San Joaquin, and Clear Creek Management Areas
Temblor buckwheat *Eriogonum temblorense*	Fed: none BLM: S CA: CRPR 1B.2	BLM surface, split estate, non-BLM land Salinas and San Joaquin Management Areas
Toro manzanita *Arctostaphylos montereyensis*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land Salinas Management Area
Tracy's eriastrum *Eriastrum tracyi*	Fed: none BLM: none CA: Rare, CRPR 3.2	Split estate, non-BLM land San Joaquin Management Areas
Umbrella larkspur *Delphinium umbraculorum*	Fed: none BLM: S CA: CRPR 1B.3	BLM surface, split estate, non-BLM land Central Coast and Salinas Management Areas
Western Hermann's buckwheat *Eriogonum heermannii var. occidentale*	Fed: none BLM: none CA: CRPR 4.2	BLM surface, non-BLM land San Benito and Clear Creek Management Areas
Western lessingia *Benitoa occidentalis*	Fed: none BLM: none CA: CRPR 4.3	BLM surface, split estate, non-BLM land San Benito, San Joaquin, and Clear Creek Management Areas
Woodland woollythreads *Monolopia gracilens*	Fed: none BLM: S CA: CRPR 1B.2	Split estate, non-BLM land San Joaquin Management Area

Sources: BLM (2006), CNPS (2015a), CDFW (2015a, 2015b, 2015c), with additional information from Calflora (2015). Occurrence within Planning Area is based on CDFW (2015c),Calflora (2015), BLM (2006), and updates from BLM staff (2015).
Key to status codes listed at the bottom of Table 3.12-2.

Management Areas

See Tables 3.12-2 and 3.12-3 for a list of the special status species known or likely to occur in each Management Area and the conservation status for each. Additional information on a few notable species is summarized from the RMP FEIS (BLM, 2006) and provided below.

Central Coast Management Area

There are two areas of BLM-administered lands within the Central Coast Management Area — the Coast Dairies and the Fort Ord National Monument. Neither of these lands are open to oil and gas development so the discussion below is provided for informational purposes only.

Coast Dairies. Designated critical habitat for the federally listed threatened western snowy plover (*Charadrius alexandrinus nivosus*) is located on or adjacent to the Coast Dairies at Scotts Creek Beach and Laguna Creek Beach, and breeding plovers have occupied both sites (ESA, 2003, pg. III-7).

The federally listed threatened California red-legged frog (*Rana aurora draytonii*) is widely distributed on the Coast Dairies, and breeds in a number of ponds on the property (ESA, 2003, pg. III-7).

One of the six perennial watersheds situated partially or entirely within Coast Dairies Property lines, San Vicente Creek supports a self-sustaining population of federally listed threatened steelhead (*Oncorhynchus mykiss irideus*) and also contains one of the last remnant populations of the State-listed endangered coho salmon (*Oncorhynchus kisutch*) south of San Francisco Bay (ESA, 2003, pg. III-10).

The State Fully Protected American peregrine falcon (*Falco peregrinus anatum*) has been observed soaring over the coastal cliffs. The area also provides important habitat for wintering raptors (ESA, 2003, pg. III-9).

Fort Ord National Monument. Fort Ord has extensive suitable habitat for the federally listed endangered sand gilia (*Gilia tenuiflora ssp. arenaria*) and constitutes at least half of this species' range. Fort Ord also supports large populations of the federally listed threatened Monterey spineflower (*Chorizanthe pungens var. pungens*) (USACE, 1997, pg. S-18).

Beaches at Fort Ord support breeding populations of the federally listed threatened western snowy plover. Fort Ord has also been identified as important habitat for the federally listed endangered Smith's blue butterfly (*Euphilotes enoptes smithi*) (USACE, 1997, pg. S-21).

Salinas Management Area

Although the Salinas management area falls within the range of multiple special status species, only the prairie falcon has been recorded as occurring on these lands (BLM, 2006). The following special status species are expected to occur area-wide, or their specialized habitat criteria are met within this management area: California red-legged frog, western pond turtle (*Emys marmorata*), western spadefoot toad (*Spea hammondii*), arroyo toad (*Anaxyrus californicus*), California tiger salamander (*Ambystoma californiense*), coast horned lizard (*Phrynosoma blainvillii*), two-striped garter snake (*Thamnophis hammondii*), Smith's blue butterfly, and least Bell's vireo (*Vireo bellii pusillus*).

San Benito Management Area

Special status plants occurring on Federal mineral estate within the San Benito Management Area include the San Benito evening-primrose (*Camissonia benitensis*). Previously known only from serpentine alluvial flats, terraces, and alluvial outwash terraces and deposits near San Benito Mountain (USFWS, 2009, pg. 2), the known range of the species has recently been extended south into Monterey County at Highway 198 just west of Priest Valley, and its habitat type has been broadened to include serpentine alluvial stream terraces, serpentine geologic transition zone (serpentine soils in uplands along geologic boundaries), serpentine rock outcrops, and greywacke outcrops.

Sensitive wildlife species occurring on BLM-managed lands within the San Benito Management Area include the foothill yellow-legged frog (*Rana boylii*), two-striped garter snake, western pond turtle, silvery legless lizard (*Anniella pulchra pulchra*), coast horned lizard, and multiple birds and mammals that occur area-wide. Species that have not been encountered during surveys on BLM-managed lands but may occur within the area include special status invertebrates, California red-legged frog, western spadefoot toad, and California tiger salamander.

San Joaquin Management Area

The San Joaquin Management Area lies within the Central Valley of California, which is comprised of the San Joaquin and Sacramento Valleys. Historically, the habitats found in the Central Valley were valley grasslands, freshwater wetlands, and riparian woodlands. This area has been impacted by agriculture and development, with resulting habitat loss and degradation. A number of upland species of the San

Joaquin Valley have been federally listed. The USFWS published the Recovery Plan for Upland Species of the San Joaquin Valley, California in 1998 (USFWS, 1998). This recovery plan addresses 34 species of plants and animals that occur within the San Joaquin Valley, the majority of which occur in arid grasslands and scrublands. The ultimate goal of this recovery plan is to delist the 11 endangered and threatened species and ensure the long-term conservation of the 23 species of concern. Multiple species presented within the recovery plan occur on lands managed by the CCFO and are classified as threatened or endangered or are considered sensitive species. This recovery plan is further detailed below.

The California jewelflower (*Caulanthus californicus*) is found on BLM-managed land in the Kreyenhagen Hills in Fresno County (USFWS, 1998, pg. 27). San Joaquin woollythreads (*Monolopia congdonii*) is found on BLM-managed land in the Jacalitos Hills and Panoche Hills (USFWS, 1998, pg. 46) and at Panoche Creek, Monocline Ridge, and Kettleman North Dome.

The Panoche Hills management unit includes approximately 7,800 acres of significant habitat areas for sensitive species in the "plateau area" of the Panoche Hills, designated as an Area of Critical Environmental Concern (ACEC). There are four sensitive wildlife species found in the management unit: the San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia silus*), the giant kangaroo rat (*Dipodomys ingens*), and the San Joaquin antelope squirrel (*Ammospermophilus nelsoni*). The BLM has documented giant kangaroo rat colonies within the Panoche Hills plateau area. Additional colonies occur adjacent to the management unit in the extreme southeastern portion of the Panoche Hills outside of BLM-managed land.

The Griswold-Tumey Hills management unit has also designated 2,500 acres of significant habitat areas for sensitive species in the "plateau area" in the northern Tumey Hills. Three sensitive species — the San Joaquin kit fox, giant kangaroo rat, and San Joaquin antelope squirrel — have been observed in the Tumey Hills Plateau area. The blunt-nosed leopard lizard has also been observed on private lands adjacent to the Tumey Hills management unit in eastern Panoche Valley. Several kit fox dens and kangaroo rat colonies occur within the management unit and on adjacent private lands. Both the Panoche Hills and Tumey Hills management units may have some of the largest active giant kangaroo rat colonies outside of San Luis Obispo County.

The Ciervo Hills/Joaquin Rocks management unit has approximately 9,700 acres designated for sensitive species. The San Joaquin kit fox, giant kangaroo rat, and San Joaquin dune beetle (*Coelus gracilis*) have been documented within the management unit. The San Joaquin dune beetle has been confirmed at five of the seven duneland soil areas. These duneland soil areas support Mojave Desert vegetation communities in seven distinctly separate areas comprising approximately 1,000 acres along the Monocline Ridge.

The Coalinga management unit has 14,660 acres designated for sensitive species, which include the San Joaquin kit fox and the blunt-nosed leopard lizard. The management unit also has habitat that may support the giant kangaroo rat, and species surveys for its presence are ongoing.

In addition to those species noted above, other sensitive species occurring within management units of the San Joaquin Management Area are: the short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), San Joaquin pocket mouse (*Perognathus inornatus inornatus*), Ciervo aegilian scarab beetle (*Aegiala concinna*), Doyen's trigonoscuta dune weevil (*Trigonoscuta sp.*), molestan blister beetle (*Lytta molesta*), and the Morrison's blister beetle (*Lytta morrisoni*).

San Joaquin Valley Recovery Plan

Portions of the Planning Area are within the San Joaquin Valley. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS, 1998) uses an ecosystem-level strategy to address recovery and conservation of 11 listed species and 23 additional special status species. The strategy includes several elements that relate to the management of public land:

- The primary focus of recovery should be on publicly owned lands;
- Conservation efforts should focus on fewer larger blocks of land rather than smaller more numerous parcels;
- Blocks of conservation lands should be connected by natural land or land with compatible uses that allow for movement between blocks;
- Emphasis should be placed on the San Joaquin kit fox as an umbrella species. Since most other species require less habitat, fulfilling the management and habitat needs of the San Joaquin kit fox will also meet the needs of many other species;
- The giant kangaroo rat and San Joaquin kangaroo rat are keystone species in their communities. Protection of these keystone species should be a high priority since they provide an important or essential function for many other listed and special status species;
- Uses and actions on public land, such as livestock grazing, oil, gas, and mineral exploration and extraction, hunting, and recreation should occur so as minimize degradation of habitat for special status species;
- Use specialty preserves or small reserves to manage species with highly restricted geographic ranges or specialized habitat requirements or that are vulnerable to traditional land uses;
- Target existing natural lands occupied by special status species over unoccupied natural land and retired farm land for conservation;
- Coordinate carefully agricultural land retirement with endangered species recovery for species where sufficient occupied natural land does not exist, but where it is needed to increase population size or promote movement between populations;
- Enhance landscape features that allow successful survival and movement from population centers on the valley floor to the valley perimeter for species such as the kit fox that can live in or move through the farmland matrix; and
- Implementing the recovery plan should be complementary to existing and future habitat conservation plans.

The foundation of the regional conservation strategy is a system of reserves and connecting corridors. Through assessments of remaining natural land habitats, a reserve system concept was developed to conserve the best remaining habitats of the San Joaquin Valley natural communities (USFWS, 1998). Several large keystone reserves, several small specialty reserves, and connecting corridors linking many of the reserves have been established or proposed. The large reserves are intended to maintain and conserve multiple plant and animal listed species as a natural community, while the small reserves are designed to conserve a particular species or unique natural feature. These reserves are managed for long-term conservation of the listed plants and animals and the natural communities on which they depend, but allow for a variety of land uses managed in a compatible manner. Both large and small reserves are necessary to conserve the valley's biological resources.

Reserves include both large multispecies reserves and small specialty reserves that would be managed primarily for listed plants and animals. While other compatible resource uses could occur, habitat quality and species' populations would be maintained through implementing specific design features for these resource uses. Management of the reserves would be assured by fee acquisition, by Federal, State, or local agencies, chartered conservation organizations, conservation easements, or long-term cooperative agreements with landowners. The goal is to maintain a certain percentage of the native lands as high-quality habitat and to rehabilitate lands with nonnative species as they become available for purchase, easement, or agreement. A threshold for habitat disturbance from energy mineral development, roads, and facilities would be established. Reserves and connecting corridors would have different thresholds for habitat disturbance. Compensation for new habitat disturbance within the threshold would be at a

standard rate for uses that are considered permanent habitat loss and at another standard rate for temporary habitat loss. Compensation is generally in the form of preserving additional habitat to make up for the loss of habitat associated with approved projects.

Connecting corridors are composed of native and agricultural lands to be managed for maintaining interchange and gene flow between the primary reserves and for maintaining supplemental populations between reserves. Emphasis is to maintain a certain percentage of native lands as moderate- to high-quality habitat and to maintain a certain percentage of the agricultural lands in agricultural production or fallow. A certain percentage of these lands would be available for urban, industrial, or other land uses that are considered permanent habitat loss. Land use design would maintain corridor integrity as extant habitat and for wildlife movements. Permanent habitat loss from urban-industrial uses would not sever wildlife corridors. Compensation for habitat loss in corridors would be directed to the reserve areas; however, limited compensation could be directed back to the corridor. The compensation ratio is the same as for reserves. Corridors would not normally involve purchase but would be secured through conservation easements and agreements. However, some parcels essential to maintain corridors or buffers may need to be purchased.

As part of the recovery plan, a generalized reserve system map has been developed that identifies the keystone reserves, small specialty reserves, and connecting corridors.

On native lands outside the reserve and corridor system, management for the retention of habitat values has not been the focus. Most of these lands have some habitat value, and many of these areas may be valuable sources of plant and animal populations in the short term. Most of these values will continue to exist, unless there are dramatic changes in current land uses.

Leases Subject to Settlement Agreement

The 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are located in the Salinas and San Joaquin Management Areas, with a small section of one parcel within the San Benito Management Area. These leases are not located on any ACECs, but some are within or partially within the Ciervo Panoche Natural Area. The species listed in Tables 3.12-2 and 3.12-3 for these Management Areas and species that may occur area-wide have the potential to occur on the lease lands. There are records in the CNDDB (CDFW, 2015c) of several special status species on or within 1 mile of the lease lands; see Figures 3.12-4 for plant species and 3.12-5 for wildlife occurrences. There is no designated critical habitat on the lease lands, but critical habitat for steelhead, vernal pool fairy shrimp, and Santa Lucia purple amole is located in the vicinity of lease lands; see Figure 3.12-1a and b. Field surveys would be required to determine if these species are present or potentially present on the lease lands.

3.13 Visual Resource Management

Visual resources refer to visual considerations in the physical environment. Visual resources analysis is a systematic process to logically assess visible change in the physical environment and the anticipated viewer response to that change. Landforms, water, and vegetation patterns are among the natural landscape features that define an area's visual character, whereas buildings, roads, and other structures reflect human modifications to the landscape. These natural and built landscape features are considered visual resources that contribute to the public's experience and appreciation of the environment. Visual resource management (VRM) involves evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts. The purpose of visual resource management is to manage the quality of the visual environment and reduce the visual impact of development activities while maintaining the viability of all resource programs.

3.13.1 Introduction

This Visual Resource Management section includes the regulatory framework for visual resources, a description of the regional setting for visual resources for the U.S. Bureau of Land Management (BLM) Central Coast Field Office (CCFO) Planning Area (Planning Area) and addresses the current conditions and trends in the Planning Area. The Planning Area encompasses a 12-county region in central California (while San Francisco County is within the Planning Area, there are no BLM-managed public lands currently located in that county).

3.13.2 Regulatory Framework

Visual resources on BLM-managed lands are regulated by guidance provided by the BLM's VRM system, as documented in the BLM Handbook H-8410-1 (BLM, 1986). The VRM system facilitates inventory, management, and planning for public lands under its jurisdiction and assigns one of four VRM classes (I through IV) to inventoried lands with specific management prescriptions for each class. VRM classification consists of two stages:

- An inventory of visual resources (VRI) and
- Analysis of the inventory and designation of the management class.

Classifications are determined by rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. The four inventory and management classes and their objectives are defined as follows:

- **Class I Objective:** To *preserve the existing character* of the landscape. The *level of change* to the characteristic landscape *should be very low* and must not attract attention.
- **Class II Objective:** To *retain the existing character* of the landscape. The *level of change* to the characteristic landscape *should be low* and not attract the attention of a casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III Objective:** To *partially retain the existing character* of the landscape. The *level of change* to the characteristic landscape *should be moderate (or lower)* and may attract the attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- **Class IV Objective:** To manage activities that require *major modification of the existing character of the landscape.* The *level of change* to the characteristic landscape *can be high* and may dominate the view and be the major focus of the viewer's attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements in the predominant natural features of the characteristic landscape.

The VRM class designations for each of the four BLM Management Areas (MAs) in the Planning Area are presented in Table 3.13-1. It should be noted that any BLM-administered lands in the Planning Area not specifically addressed in Table 3.13-1 are presumed to be VRM Class IV.

Table 3.13-1. Existing VRM Class Designations*

Management Area	Location with VRM Class I, II, or III Designations	VRM Class and BLM Current Decision
VRM CLASS IV STANDARDS APPLY TO ALL BLM-MANAGED PUBLIC LANDS UNLESS OTHERWISE STATED IN THIS TABLE.		
CENTRAL COAST	Santa Cruz Coast Dairies	Assumed to be VRM Class II (see Section 3.13.4)
	Ford Ord National Monument	VRM Class II
SAN JOAQUIN	Panoche Hills	VRM Class III ▪ Limit communications sites and utility rights-of-way (ROW) to existing locations.
	Panoche Hills Wilderness Study Area (WSA)	VRM Class I ▪ Panoche Hills WSA is to be managed as VRM Class I until Congress acts to either designate wilderness or release the WSA from wilderness suitability, at which point the area would be evaluated to determine the appropriate VRM designation based on laws, regulations, and policies in place at that time.
	Griswold-Tumey Hills	VRM Class III ▪ Restrict new facilities to existing routes or established utility corridors. Consider communication sites on a case-by-case basis.
	Ciervo Hills	VRM Class III ▪ Restrict new facilities to existing routes or established utility corridors. Consider communication sites on a case-by-case basis.
	Joaquin Rocks	VRM Class II
	Coalinga Mineral Springs	VRM Class III ▪ Permit no communication sites on Juniper Ridge. ▪ Consider utility ROWs on a case-by-case basis (no designated corridors).

Table 3.13-1. Existing VRM Class Designations*

Management Area	Location with VRM Class I, II, or III Designations	VRM Class and BLM Current Decision
SALINAS	Sierra de Salinas	VRM Class III ▪ Allow communication sites where visual impacts can be substantially reduced or mitigated. ▪ Limit dozer use on wildfires and prescribed burns where possible (pending BLM Fire Management Plan).
	Ventana (and Silver Peak) Wilderness Area and Pinnacles National Park Bear Mountain and Bear Canyon WSAs	VRM Class I ▪ While not managed by the BLM, Ventana (and Silver Peak) Wilderness Area and Pinnacles National Park would typically be afforded visual resource protections comparable to BLM's VRM Class I objective by the managing agencies. ▪ Bear Mountain and Bear Canyon WSAs are to be managed as VRM Class I until Congress acts to either designate wilderness or release the WSA from wilderness suitability, at which point the area would be evaluated to determine the appropriate VRM designation based on laws, regulations, and policies in place at that time.
SAN BENITO	Hernandez Valley, Call Mountain, Laguna Mountain	VRM Class III
	Pinnacles National Park and San Benito WSA	VRM Class I ▪ While not managed by the BLM, Pinnacles National Park would typically be afforded visual resource protections comparable to BLM's VRM Class I objective by the managing agency. ▪ San Benito WSA is to be managed as VRM Class I until Congress acts to either designate wilderness or release the WSA from wilderness suitability, at which point the area would be evaluated to determine the appropriate VRM designation based on laws, regulations, and policies in place at that time.

*In the event that a river or stream is designated a Wild and Scenic River (WSR) by Congress, the WSR would be managed as VRM Class I.
Source: BLM 2005, 2007

3.13.3 Regional Setting

The Planning Area consists of non-contiguous lands and isolated parcels in 11 counties in central California, and the landscape varies greatly from nearly level to rugged, mountainous terrain. Elevations range from near sea level to more than 5,000 feet. The lands managed by the CCFO are bounded by the Pacific Ocean on the west and the San Joaquin Valley on the east. They include a variety of settings and landforms including the Central Coast Range, the Salinas and San Joaquin valleys, and three major watersheds: the Pajaro, which drains into the Pacific Ocean; and Arroyo Pasajero and Silver Creek, which drain into the San Joaquin Valley.

Vegetation in the Planning Area includes forested areas, chaparral, and grassland. About two-thirds of the public lands managed by the CCFO consist of chaparral and oak woodland vegetation. Approximately one-third of the public lands (primarily on the eastern slopes of the Diablo Range and the southern Salinas Valley) consist of annual grassland and half-shrub vegetation. A stand of redwood trees is located on the Santa Cruz Coast Dairies property.

3.13.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Currently within the Planning Area, approximately 683,900 acres of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing; 67,200 acres are closed to leasing, and 41,800 acres are open to leasing subject to No Surface Occupancy (NSO) stipulations. BLM-managed lands in the Planning Area have been divided into four Management Areas (MAs): Central Coast MA (13,100 acres), San Joaquin MA (164,700 acres), Salinas MA (31,100 acres), and San Benito MA (70,500 acres). The current conditions within the Planning Area are the same as those for the No Action Alternative (Alternative A) shown on Figure 2-1. A brief description of the current conditions in each MA is provided below.

Central Coast Management Area. There are seven small, widely scattered BLM holdings in this MA. The BLM also manages 7,200 acres of Fort Ord National Monument (VRM Class II), which holds some of the last undeveloped natural wildlands along the Monterey Peninsula and is designated a Special Recreation MA. Also, as of April 2014, the BLM manages approximately 5,600 acres of the Santa Cruz Coast Dairies but does not have mineral estate rights. The Santa Cruz Coast Dairies have also been designated a Special Recreation MA that supports redwood forest and is also a gateway to the Santa Cruz Mountains. In January 2015, a public initiative was announced to establish the Santa Cruz Redwoods National Monument on the property. While no VRM class has yet been assigned to the Santa Cruz Coast Dairies, it can be assumed the property would be designated VRM Class II similar to Ford Ord National Monument.

Currently, there are areas designated active oil and gas fields in the northern and central portions of the MA. There are also areas of Federal mineral estate open to oil and gas leasing Only Fort Ord National Monument is closed to oil and gas leasing in the MA. There are no areas open to oil and gas leasing with NSO lease stipulations (Figure 2-1).

San Joaquin Management Area. BLM public lands in this MA are highly visible from Interstate (I-) 5. Scenery in this area is typical of the grassy hills along the western edge of the San Joaquin Valley. In the Panoche Hills area (VRM Class III except for the Panoche Hills WSA, which is VRM Class I), west of I-5, two large communication sites are visible on the ridgeline but do not dominate the landscape, which is characterized by annual grasslands and scattered California junipers.

The Griswold-Tumey Hills area (VRM Class III) lies due east of the Call Mountain–Hernandez Valley area (VRM Class III), just west of the I-5 corridor. Major drainages in the area are Panoche Creek, Silver Creek, Griswold Creek, and Tumey Gulch — all intermittent streams with some portions flowing during most of the year. Vegetation and topography are similar to the Panoche Hills. Much of the rolling, grassy hills of this area are visible from I-5 and, therefore, are an important visual resource. The Griswold-Tumey Hills area contains a portion of one active oil and gas field.

South of the Griswold-Tumey Hills area and also adjacent to the I-5 corridor lies the Ciervo Hills (VRM Class III)–Joaquin Rocks (VRM Class II) area. The predominant feature in this area is the Diablo Range culminating in Joaquin Ridge, Joaquin Rocks, and Black Mountain. These arid foothills in the rain shadow of the Diablo Range are characterized by annual grassland/shrub vegetation and steep, chaparral- and oak-covered slopes. Cantua Creek is the major drainage in the area. The Joaquin Rocks area contains three, 300-foot high sandstone monoliths that jut from Joaquin Ridge and are visible from the Central Valley attracting viewers along a 20-mile stretch of I-5.

In the southern portion of the San Joaquin MA lies the Coalinga Mineral Springs area (VRM Class III). The predominant feature in the landscape is Juniper Ridge culminating in Sherman Peak (3,857 feet), Kreyenhagen Peak (3,561 feet), and Bald Mountain–Center Peak (4,541 feet). The topography in this area is typical of the inner Central Coast Range with steep, rugged canyons; sandstone cliffs; and escarpments. Warthan Canyon offers views of considerable visual interest along Highway 198. Vegetation in this region is typically mixed chaparral and chamise chaparral. There are some areas of oak savannah and oak

woodland, especially in canyon bottoms and on north-facing slopes. Yucca and California juniper are also common in this region and contribute to the scenic quality of the area. There are many springs in the area including Coalinga Mineral Springs.

In the Coalinga area east of Coalinga Mineral Springs, the predominant features are the low, rolling foothills and valley grasslands along the western edge of the San Joaquin Valley. Significant topographic features include the Kettleman Hills, the Kreyenhagen Hills, the Alcalde Hills, and Anticline Ridge. This very arid area lies in the rain shadow of the Diablo Range to the west.

Currently in the San Joaquin MA, there are designated active oil and gas fields in the northern and southern portions of the MA. There are also areas of Federal mineral estate open to oil and gas leasing, areas closed to oil and gas leasing, and areas open to oil and gas leasing with NSO lease stipulations. The Panoche Hills WSA is closed to leasing (Figure 2-1).

Salinas Management Area. The Sierra de Salinas area (VRM Class III) is visible from Highway 101, from the U.S. Forest Service Ventana Wilderness Area, and from BLM-managed lands adjacent to the Ventana Wilderness Area. Most of BLM's holdings in this area lie east of Los Padres National Forest and its steep, rugged mountains. BLM-managed lands lie primarily along the base and lower slopes of the Santa Lucia Range in Arroyo Seco Canyon, Reliz Canyon, and at the north end of the Ventana Wilderness Area. The area is characterized by dense chaparral with small areas of blue oak savannah. In this MA, the Sierra de Salinas Mountains are deeply dissected by many intermittent drainages, as well as by the Arroyo Seco and Carmel rivers.

The Williams Hill area (Class IV) in the southern portion of the Salinas MA offers views of the surrounding Salinas Valley. Pine trees, chamise, scrub oak, and shale formations characterize the hilly terrain.

A few other isolated BLM parcels (VRM Class IV) lie in eastern Monterey County at the San Benito County line, about 5 miles west of the National Park Service Pinnacles National Park. BLM-managed lands in this area generally lack features of notable visual quality and are typical of the region.

Currently in the Salinas MA, there are designated active oil and gas fields in the central and southern portions of the MA. There are also areas of Federal mineral estate open to oil and gas leasing, areas closed to oil and gas leasing, and areas open to oil and gas leasing with NSO lease stipulations (Figure 2-1).

San Benito Management Area. BLM-managed lands in this area lie in the southern portion of the MA. The Call Mountain–Hernandez Valley area (VRM Class III) lies in the east-central portion of the MA. The most predominant feature of the MA is the rugged Diablo Range, and the area is characterized primarily by chaparral vegetation with some small stands of blue oak savannah. The San Benito River flows northwest from the Hernandez Reservoir through the central portions of the MA. Laguna Creek is the other major perennial stream in the MA, flowing into Hernandez Reservoir. The remaining BLM-managed lands in this MA are in two areas in the south: one adjacent to the Clear Creek–Condon Peak area and the other a block of BLM-managed lands west of Clear Creek called Laguna Mountain (VRM Class III). Laguna Mountain contains somewhat rugged terrain in an area of rolling hills covered in dense brush. This area is popular with hikers and has a small waterfall accessible by a hiking trail.

Currently in the San Benito MA, there are designated active oil and gas fields in the northern and southern portions of the MA. There are also areas of Federal mineral estate open to oil and gas leasing, areas closed to oil and gas leasing, and areas open to oil and gas leasing with NSO lease stipulations. The San Benito WSA is closed to leasing (Figure 2-1).

Leases Subject to Settlement Agreement

The leases subject to the settlement agreement are located in the Salinas and San Joaquin MAs (see above for landscape descriptions). In the Salinas MA, these leases occur in the Williams Hill area that is designated VRM Class IV. In the San Joaquin MA, they are located in the Griswold-Tumey Hills area that is designated VRM Class III and on lands designated VRM Class IV south of Griswold-Tumey Hills.

3.14 Special Management Areas

3.14.1 Introduction

The Federal Land Policy and Management Act (FLPMA) directs the BLM to consider and evaluate lands for a number of special designations during its land use planning process. In general, lands are eligible for special designations based on the presence of particular values and qualities; lands found to possess these qualities are characterized as Special Management Areas (SMAs). SMAs receive designation or special management through different processes and are managed under special considerations.

According to the BLM's Land Use Planning Handbook, special designations fall into two categories: (1) Congressional designations (i.e., those applied by statute or Presidential proclamation), and (2) Administrative designations (i.e., those applied by the BLM through the land use planning process) (BLM, 2005). Congressional and Administrative designations that are applicable to this Draft RMPA/EIS include national monuments, national recreation and historic trails, Areas of Critical Environmental Concern, Research Natural Areas, Wilderness Areas, and Wilderness Study Areas. These designations are described in Section 3.14.3. Wild and Scenic Rivers, also a BLM special designation, is discussed in Section 3.21.

The Central Coast Field Office has partially inventoried the BLM-administered lands in their jurisdiction for wilderness characteristics. Prior to release of the Final EIS for this RMPA, an interdisciplinary team of resource specialists will inventory all remaining units of BLM-administered lands in the Central Coast Field Office to determine their potential for wilderness characteristics. This team will conduct field inventories of all units with potential wilderness characteristics. Based on the inventories, the Final EIS would identify lands with wilderness characteristics and how they would be affected by the BLM's oil and gas leasing and development program.

3.14.2 Regulatory Framework

During development of a BLM resource management plan (RMP) or an amendment to an existing plan, the BLM must integrate planning for special designations (i.e., SMAs) with the general RMP planning process (BLM, 2009). Each BLM Field Office must ensure that the RMP identifies the objects or resources for which the area was designated and illustrate how those objects or resources are protected by the plan. The RMP must also clearly distinguish between the planning area for the RMP and the planning area for the special designation. Additionally, an integrated planning process should conclude with an independent Record of Decision for both the RMP planning area and the special designation planning area (BLM, 2009).

The CCFO Planning Area is divided into five discrete management areas (MAs): Central Coast MA, San Joaquin MA, Salinas MA, San Benito MA, and Clear Creek MA. The boundaries for these management areas are shown in Figure 3.14-1. While the RMP establishes regulations and policies that guide public land management across the entire CCFO Planning Area, the BLM has also adopted management plans that are specific to a particular SMA and that provide special management guidance for that SMA. The following regulations and policies are applicable to SMAs in the CCFO Planning Area:

National Monuments

California Coastal National Monument Resource Management Plan (September 2005)

The California Coastal National Monument was established through a Presidential proclamation in January 2000. The California Coastal National Monument RMP provides the guidance, objectives, policies, and management actions for the monument's public lands that are administered by the BLM. The management goals of the RMP include: (1) protect the monument's geological formations and the habitat that they provide for biological resources; (2) protect the monument's scenic and cultural values; (3) pro-

vide and promote research opportunities; (4) provide interpretive information and educational initiatives regarding the values and significance of the monument; and (5) coordinate planning and management activities with the monument's numerous jurisdictions. The decisions in the RMP apply only to BLM-managed lands within the boundary of the national monument.

The following management action from the California Coastal National Monument RMP is applicable to oil and gas leasing:

- **AU-GEO-2 (Mineral Removal):** Specific resource protections contained in existing BLM land withdrawals and guidance contained in the Presidential Proclamation prohibit removal of minerals with commercial value from the California Coastal National Monument.

Fort Ord National Monument

In April 2012, a Presidential proclamation established 14,650 acres of Federal lands as the Fort Ord National Monument. The monument currently includes 7,200 acres of BLM-administered land and 7,450 acres of land managed by the U.S. Army. The Army is currently overseeing environmental remediation activities on the Fort Ord land within its jurisdiction. As stated in the proclamation, the Army will transfer this land to the BLM in accordance with a 1995 Memorandum of Understanding (MOU) between these two agencies. The MOU describes the responsibilities of each agency related to such lands, the implementing actions required of each agency, the process for transferring administrative jurisdiction over such lands to the Secretary of the Interior (i.e., BLM), and the processes for resolving interagency disputes. Fort Ord has been withdrawn from mineral entry and mineral leasing.

National Trails

National Trails System Act

The National Trails System Act of 1968, as amended, instituted a national system of recreation, scenic and historic trails and prescribed the methods and standards to which additional components may be added to the system (16 USC 1241-1251). National recreation trails are established to provide a variety of outdoor recreation uses in or reasonably accessible to urban areas. National historic trails closely follow a historic trail or route of travel of national significance, and are established to protect historic remnants and artifacts for public use and enjoyment. National scenic trails provide maximum outdoor recreation potential, conservation, and enjoyment of the various qualities of the areas they pass through (i.e., scenic, historical, natural, and cultural).

National Scenic and Historic Trails Strategy and Work Plan

In 2006, the BLM approved a National Scenic and Historic Trails Strategy and Work Plan, which provides a framework for the development of program guidance and direction for improved management of its National Trails (BLM, 2006, pg. 7-8). The following objectives and actions from the Trails Strategy and Work Plan would be applicable to the RMPA/EIS:

- **Objective 1:** Establish and implement national policy and guidance to identify and protect trail resources in conjunction BLM's multiple-use mandate.
  - **Action 5 (Develop Manuals or Handbooks):** Develop a series of BLM manuals or handbooks that would address resource assessment, protection, and proper utilization of the National Scenic and Historic Trails. Documents would emphasize and expand proper trail management, address on-the-ground information, reference appropriate existing handbooks, and provide guidance. Topics to be considered would include Trail-specific Best Management Practices (e.g., energy and minerals, livestock grazing, riparian, watershed, fisheries, wildlife, recreation, wilderness, lands and realty).

- **Objective 2:** Ensure National Scenic and Historic Trail management is addressed within the BLM's planning system.
  - **Action 3 (Prepare Management Plan Where Required or Necessary):** Prepare guidance and develop plans as required or needed that consider special management areas along trails (e.g., Areas of Critical Environmental Concern and Special Recreation Management Areas). Consider withdrawals or lease and permit stipulations as management tools.

Areas of Critical Environmental Concern and Research Natural Areas

Areas of Critical Environmental Concern

An Area of Critical Environmental Concern (ACEC) is defined in FLPMA, Public Law 94-579, Section 103(a) as an area within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards. Restrictions that arise from an ACEC designation are determined at the time the designation is made, and are designed to protect the values or serve the purposes for which the designation was made. The BLM has prepared regulations for implementing the ACEC provisions of FLPMA, which are found at 43 CFR 1610.7-2(b). BLM Manual 1613 (Areas of Critical Environmental Concern) provides policy and procedural guidance on the identification, evaluation, and designation of ACECs (BLM, 1988a). The following is a brief summary of the specific planning guidance for each ACEC within the CCFO administrative area.

Clear Creek Management Area Resource Management Plan. The Clear Creek MA Resource Management Plan (RMP) provides guidance for the management of approximately 63,000 acres of public lands in southern San Benito and western Fresno Counties (BLM, 2014a, pg. 1-5). This management area includes the Clear Creek Serpentine ACEC and the Joaquin Rocks ACEC. Objectives and actions from the Clear Creek MA RMP that would be applicable to this RMPA/EIS include:

- **ENERG-DEF1 (Land Use Plan Decision).** Allow no mineral leasing or sales on public lands in the Serpentine ACEC. Recommend withdrawal of the entire 30,000-acre ACEC from locatable mineral entry.
- **ENERG-DEF2 (Land Use Plan Decision).** Allow mineral leasing or sales on public lands outside the Serpentine ACEC, and stipulate that "No Surface Occupancy" is allowed on occupied special status species habitat within oil and gas lease areas.

Panoche-Coalinga ACEC Management Plan of 1987. This ACEC management plan provides special guidance for management of the Panoche-Coalinga ACEC. The management plan recognizes significant habitat areas for sensitive plants and animals and recommends measures for their management including guidelines for surface disturbing activities, limitations on grazing, policies for land acquisition, and monitoring requirements.

Research Natural Areas

A Research Natural Area (RNA) is a BLM designation that establishes and maintains lands for the primary purpose of research and education. These areas have one or more of the following characteristics: (1) typical representation of a common plant or animal association; (2) unusual plant or animal association; (3) threatened or endangered plant or animal species; (4) typical representation of common geologic, soil, or water features; or (5) outstanding or unusual geologic, soil, or water features. According to the BLM's Land Use Planning Handbook, RNAs are considered a type of ACEC. The criteria that apply to evaluating existing or proposed ACECs would also apply to RNAs (BLM, 2005).

Wilderness and Wilderness Study Areas

In 1964, Congress passed the Wilderness Act that established a national system of lands for the purpose of preserving a representative sample of ecosystems in a natural condition for the benefit of future generations. Wilderness Study Areas (WSAs) contain wilderness characteristics such as naturalness, solitude, and opportunities for primitive and/or unconfined recreation and are managed to preserve those values until Congress either designates them as wilderness or releases them for other uses. Until 1976, most land considered for, and designated as, wilderness was managed by the National Park Service and the U.S. Forest Service. With the passage of FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated wilderness. The BLM published its California Statewide Wilderness Study Report in 1991 (BLM, 1991). Areas identified as WSAs are to be managed according to the BLM Manual 6330 (Management of BLM Wilderness Study Areas), until they are designated wilderness or released by Congress (BLM, 2012).

Areas that are designated as wilderness are managed under the provisions of the Wilderness Act of 1964 and their establishing legislation. The following activities are prohibited in Wilderness Areas: commercial enterprises; construction of temporary or permanent roads; use of motorized vehicles and other mechanical transport; aircraft landings; and construction of structures and other installations.

Three categories of exceptions to prohibited activities in Wilderness Areas include:

- **Valid Existing Rights.** Prior existing rights may continue. Discretionary uses that create new rights are not permitted;
- **Administrative Actions.** New roads or commercial roads are not authorized. However, the BLM may re-evaluate and authorize any of the other prohibitions listed above by invoking the "minimum requirements exception" in order to meet the minimum requirements to administer and protect the lands, and the health and safety of people in the area; and
- **General Allowances.** These are subject to limitations set by the BLM State Director. These allowances may include actions to control fire and insects and diseases and facilitate Federal mineral surveys, livestock grazing, access to landholdings, and commercial services compatible with wilderness values and necessary to realize the recreation or other wilderness character purposes of the land.

Proposed Recreation Area

H.R. Bill 1838, which was introduced to Congress in April 2015, proposes the establishment of the Clear Creek National Recreation Area across portions of San Benito and Fresno Counties that are currently within the BLM's Clear Creek MA. The proposed recreation area would be managed by the BLM and would allow off-highway vehicle recreation, hunting, and rock and gem collecting. Per H.R. Bill 1838 Section 4(k), all Federal lands within the proposed recreation area would be withdrawn from operation of the mineral leasing, mineral materials, and geothermal leasing laws. This bill has currently been referred to the Subcommittee on Federal Lands (Congress.Gov, 2015). Until such time that the proposed designation for the Clear Creek National Recreation Area is approved by Congress, this proposed recreation area would continue to be managed per the objectives and actions of the Clear Creek MA RMP.

3.14.3 Regional Setting

For the SMA analysis, the planning area for this RMPA/EIS is defined as the SMAs that are currently designated within the CCFO Planning Area boundary and are managed by the BLM (see Figure 3.14-1). Amendments to the BLM's RMP to address oil and gas leasing and development would apply only to BLM-managed lands. Consequently, SMAs located within the CCFO Planning Area boundary that are managed by other Federal agencies, and are not located on BLM-administered lands, are also not included in the planning area.

National Monuments

There are currently two national monuments within the planning area (see Figure 3.14-1):

- **California Coastal National Monument.** The monument includes more than 20,000 rocks, islands, exposed reefs, and pinnacles along the California coast (BLM, 2015a). The BLM manages the portions of the monument that extend within its CCFO Planning Area boundary in San Mateo, Santa Cruz, and Monterey Counties.
- **Ford Ord National Monument.** The monument was established to protect its scenic and natural resources, and to maintain the cultural and historic significance of this former U.S. Army training center and deployment staging ground (BLM, 2015b).

National Trails

The planning area includes the following two national trails (see Figure 3.14-1):

- **Juan Bautista de Anza National Historic Trail.** This trail was designated in the National Trails System Act of 1968 and designated a Millennium Trail in 2000. The trail follows portions of the overland route traveled by Captain Juan Bautista de Anza of Spain from Sonora, Mexico, to the vicinity of San Francisco, California. Portions of the trail traverse Federal mineral estate in Santa Clara County. The BLM also manages a 12-mile portion of the trail route across the Fort Ord National Monument.
- **Coalinga Mineral Springs National Recreation Trail.** This trail was designated under the National Trails System Act in 1981. The trail is located on the southern tip of the Diablo Mountains, and extends approximately 2.5 miles to Kreyenhagen Peak. The area around the trail is popular for hunting, especially for wild pigs that inhabit the surrounding area (BLM, 2015c).

Areas of Critical Environmental Concern and Research Natural Areas

There are currently two RNAs and three ACECs within the planning area (see Figure 3.14-1):

Research Natural Areas

- **Monvero Dunes.** This proposed RNA is characterized as a sand dune ecosystem dominated by disjunct plant species that typically occur in the Mojave Desert such as Mojave sand verbena (*Abronia pogonantha*), birdcage evening primrose (*Oenothera deltoides*), wild rhubarb (*Rumex hymenosepalus*), and sand grass (*Stipa hymenoides*) The following federally endangered species are known to occur within or along the edges of the proposed Monvero Dunes RNA: San Joaquin woollythreads (*Monolopia congdonii*), blunt-nosed leopard lizard (*Gambelia sila*), and San Joaquin kit fox (*Vulpes macrotis mutica*) (BLM, 2015d).
- **San Benito Mountain.** This RNA was designated by the BLM in 1999 to encourage scientific research and provide protection for the unique conifer forest and serpentine vegetation communities on and around San Benito Mountain. The San Benito Mountain Forest is the only forest in the world that supports Jeffrey (*Pinus jeffreyi*), Coulter (*Pinus coulteri*), and Foothill pine (*P. sabinaiana*) incense cedar (*Calocedrus decurrens*), and Jeffrey-Coulter hybrids. The federally listed threatened San Benito evening-primrose (*Camissonia benitensis*) also occurs in this area (BLM, 2015e).

Areas of Critical Environmental Concern

- **Clear Creek Serpentine ACEC.** This 31,000-acre ACEC was designated in the 1984 Hollister RMP based on the human health risk associated with the naturally occurring asbestos and the occurrence of special status plant species endemic to the area (BLM, 2014a, pg. 1-1).
- **Panoche/Coalinga ACEC.** This ACEC was established to protect its significant habitat for rare, threatened, and endangered plants and wildlife, as well as its important historic and paleontological resources

(BLM, 2015f). The ACEC stretches from the Panoche Hills southwards to Coalinga connecting a vast landscape of ancient desert-like habitats and open space with outstanding scenic and recreational values in the western San Joaquin Valley. These lands, administered by the CCFO, are known as the "San Joaquin Desert Hills" (BLM, 2014b).

- **Joaquin Rocks ACEC.** This 8,000-acre ACEC is accessible only by traveling through the Clear Creek Serpentine ACEC. This rugged and remote area is notable for its 300-foot high sandstone monoliths that jut from Joaquin Ridge.

Wilderness/Wilderness Study Areas

A total of three Wilderness Areas and five WSAs are located within the CCFO Planning Area boundary. However, only a small acreage of designated wilderness would be located on BLM-administered lands. The following Wilderness Areas are not managed by the BLM and are not included in the SMA planning area: 240,000 acres of Ventana Wilderness [managed by the U.S. Forest Service] (USFS, 2015), Silver Peak Wilderness [managed by the U.S. Forest Service], and Pinnacles Wilderness [managed by the National Park Service].

Since the passage of Public Law 107-370-(2)(2) on December 19, 2002, the following Wilderness Area and WSAs are recognized within the SMA planning area. The WSAs are currently being managed to preserve their wilderness values according to the BLM Manual 6330 (Management of BLM Wilderness Study Areas), and would continue to be managed in that manner until Congress either designates them as wilderness or releases them for other uses (BLM, 2012). If these areas are released from WSA status by Congress, they would be managed consistent with the rest of the management area and area-wide decisions.

- **Ventana Wilderness.** Congress designated 736 acres of BLM lands as the "Ventana Wilderness Additions" in 2002. This site is contiguous to the Ventana Wilderness Area in the Los Padres National Forest. The BLM-managed Ventana Wilderness encompasses approximately 40 acres in Anastasia canyon, 680 acres surrounding Black Rock Ridge, and 16 acres near Horse Canyon (BLM, 2015g).
- **Bear Mountain WSA.** This 318-acre WSA was determined by the BLM to provide an outstanding opportunity for solitude, and the roadless character of the area provides primitive and unconfined types of recreation. Elevation within the WSA varies from 1,800 to 3,000 feet above sea level. Major vegetation includes pine and oak trees along with chamise (BLM, 2015h).
- **Bear Canyon WSA.** This 3,198-acre WSA was determined by the BLM to provide an outstanding opportunity for solitude, and the roadless character of the area provides primitive and unconfined types of recreation. The WSA is dominated by very steep rugged terrain accentuated by intermittent streams located in the canyon bottoms (BLM, 2015i)
- **Panoche Hills North WSA.** This 6,631-acre area was characterized as unsuitable for wilderness classification. The BLM recommended that this area remain open for oil and gas exploration and development due to the moderate potential for the occurrence of oil and gas reserves in this WSA (BLM, 1988b). However, this WSA will continue to be managed according to BLM Manual 6330 until Congress makes a final determination on its designation.
- **Panoche Hills South WSA.** This 11,305-acre area was characterized as unsuitable for wilderness classification. The BLM recommended that this area remain open for oil and gas exploration and development due to the moderate potential for the occurrence of oil and gas reserves in this WSA (BLM, 1988c). However, this WSA will continue to be managed according to BLM Manual 6330 until Congress makes a final determination on its designation.

- **San Benito WSA.** This WSA was determined unsuitable for wilderness classification due to its insufficient size and previous development within the area (BLM, 1980). In 1971, the BLM designated this WSA as a Natural Area to preserve its botanically unique vegetative communities, and the area was designated as an RNA in 1999 (see San Benito Mountain RNA discussion). This WSA will continue to be managed according to BLM Manual 6330 until Congress makes a final determination on its designation.

3.14.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Since adoption of the 2007 HFO RMP, specific SMAs have been open to oil and gas leasing (e.g., Panoche/Coalinga ACEC). However, restrictions such as NSO stipulations and an endangered species stipulation currently apply to any leases permitted within an ACEC, as described in Appendix D of the 2007 HFO RMP (BLM, 2007). SMAs that are closed to oil and gas leasing per the 2007 HFO RMP include designated Wilderness Areas, WSAs, and Fort Ord (BLM, 2007). The following is a discussion of the management of SMAs in regards to current oil and gas development within the planning area.

National Monuments

The Fort Ord National Monument and the California Coastal National Monument are closed to oil and gas leasing per Presidential Proclamations 7264 and 8804, which state:

> *All Federal lands and interests in lands within the boundaries of this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, leasing, or other disposition under the public lands laws, including withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing other than by exchange that furthers the protective purposes of the monument.*

Specific guidance in existing BLM management plans (e.g., California Coastal National Monument RMP) further identify resource protections and restricted uses that are applicable to its management area, as described in Section 3.14.2.

National Trails

The Juan Bautista de Anza National Historic Trail meanders across Federal, State, and private land within and beyond the BLM's CCFO Planning Area boundary. The trail traverses a total of 4.8 miles of split estate land, and would not cross BLM-administered surface estate. None of the existing trail is located within active oil and gas fields.

Coalinga Mineral Springs National Recreation Trail is located within an area of Federal mineral estate, approximately 7 miles west of active oil and gas fields.

Areas of Critical Environmental Concern and Research Natural Areas

Oil and gas leasing has taken place within existing ACECs in the planning area. Table 3.14-1 lists the oil and gas leases within each ACEC and RNA, as well as the number of existing wells in order to provide a measure of oil and gas activity in that area.

Table 3.14-1. Existing Leases and Wells within Central Coast Field Office ACECs and RNAs

ACEC or RNA	Total within ACEC or RNA		Total Acreage of Leases within ACEC or RNA
	Leases	Wells	
Clear Creek Serpentine ACEC	1	0	116
Panoche/Coalinga ACEC	40	130	9,534
Joaquin Rocks ACEC	0	0	0
Monvero Dunes RNA	0	0	0
San Benito Mountain RNA	0	0	0

Wilderness and Wilderness Study Areas

Wilderness Areas and WSAs are closed to oil and gas leasing per the Wilderness Act of 1964 and BLM Manual 6330 (Management of BLM Wilderness Study Areas). As described in Section 3.14.2, only Congress can designate the WSAs established under Section 603 of FLPMA as wilderness or release them for other uses. The status of the existing WSAs and the management guidance for these areas would not change as a result of this RMPA/EIS.

Leases Subject to Settlement Agreement

The proposed 14 non-NSO leases are located in San Benito and Monterey Counties within the CCFO Planning Area boundary. In San Benito County, eight of the lease sites would be approximately 2.5 miles north of San Benito Mountain RNA and 5.6 miles south of the Panoche Hills South WSA. In Monterey County, 6 of the lease sites would be located across a range of approximately 14 miles to 34 miles south-east of Bear Canyon WSA, which would be the nearest SMA to these leases.

3.15 Cultural and Heritage Resources

3.15.1 Introduction

Cultural resources are locations of human activity, occupation, or use. They include expressions of human culture and history in the physical environment, such as prehistoric or historical period archaeological sites, buildings, structures, objects, districts, or other places. Cultural resources can also be natural features, plants, or animals that are considered to be important to a past or contemporary culture, subculture, or community. The Affected Environment chapter of the Central Coast Field Office (CCFO) Proposed RMP/Final EIS provides a comprehensive review of existing archaeological and historical background information as of 2007 for the Planning Area (BLM, 2007).

Prehistoric resources are recognized as those attributed to Native American groups who occupied the region prior to European contact. Historical period resources are those generally over 50 years old and associated with Native American contact period history, and European, and American exploration, settlement and development. Although a few explorers traversed the region earlier, in California the time of contact between Native Americans and Europeans is generally identified as the 1770s.

Sites of cultural significance to contemporary populations are referred to as Traditional Cultural Properties (TCP). These sites are rooted in the community's history and are important in maintaining cultural identity. Examples of TCPs for Native American communities include natural landscape features, trail systems, places used for ceremonies and worship, places where plants are gathered that are used in traditional medicines and ceremonies, places where artisan materials are found, and places and features of traditional subsistence systems, such as hunting areas.

3.15.2 Regulatory Framework

Federal laws and regulations have been established to protect the nation's historic resources, including archaeological sites containing important scientific or historical data as well as historic buildings, monuments, and other features of the built environment. In addition to the Federal Land Policy and Management Act (FLPMA, Pub. L. 91-579) of 1976, which requires BLM to prepare resource management plans for all resource types, the following authorities are applicable specifically to cultural resources.

Antiquities Act of 1906 (16 USC 431-433). The Antiquities Act provides that penalties shall be assessed against "any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States" except as granted permission by the appropriate secretary of the department having jurisdiction; authorizes the President to establish national monuments for the preservation of "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest" on lands owned or controlled by the government; and permits the examination, excavation, or gathering of antiquities from government property by recognized scientific or educational institutions in accordance with uniform rules defined in the act.

National Historic Sites Act (NHSA) of 1935 (16 USC 46-467). The NHSA established as a national policy the preservation of historic resources, including historic sites, buildings, and objects of national significance.

National Historic Preservation Act (NHPA) of 1966, as amended through 2000 (16 USC 470). Under Section 106 of the NHPA, effects of any Federal or federally assisted undertaking on historic properties must be considered and the Advisory Council on Historic Preservation must be afforded a reasonable opportunity to comment on the undertaking before it is approved or licensed or before approving the expenditure of funds on any undertaking that may affect properties listed or eligible for listing in the National Register. Section 110 of the NHPA, as amended, stipulates that each Federal agency shall estab-

lish a preservation program for the identification, evaluation, and nomination to the National Register and protection of historic properties. Section 112, as amended, stipulates that the Office of Budget and Management shall establish qualification standards for archeology, architecture, conservation, curation, history, landscape architecture, and planning that must be met by agency personnel or contractors responsible for cultural resources.

Archeological Resources Protection Act (ARPA) of 1979, as amended (16 USC 470aa–470ll). ARPA imposes both civil and criminal penalties for the excavation or removal of protected resources from Federal or Indian lands without the required permit. Federal land managers are also required to "establish a program to increase public awareness of the significance of the archeological resources located on public lands and Indian lands and the need to protect such resources" (16 USC 470ii). ARPA also requires that the Secretaries of the Interior, Agriculture, and Defense and the Chairman of the Board of the Tennessee Valley Authority (1) develop plans for surveying lands under their control to determine the nature and extent of archeological resources on those lands; (2) prepare a schedule for surveying lands that are likely to contain the most scientifically valuable archeological resources; and (3) develop documents for reporting of suspected violations of this chapter and establish when and how those documents are to be completed by officers, employees, and agents of their prospective agencies (16 USC 470mm).

American Indian Religious Freedom Act (AIRFA) of 1978 (92 Stat. 469). AIRFA states, "It shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian… including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rights."

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (104 Stat. 3048-3058). NAGPRA established procedures to determine the ownership and disposition of Native American and native Hawaiian human remains, funerary objects, sacred objects, or objects of cultural patrimony discovered on Federal lands. The law establishes penalties for persons convicted of illegal trafficking in Native American human remains and cultural items and requires Federal agencies to inventory their collections of human remains and associated or unassociated funerary objects, determine ownership, and repatriate cultural items in accordance with the provisions of the law.

36 Code of Federal Regulations, Part 800 – Protection of Historic and Cultural Properties (36 CFR 800). This Federal code contains the Advisory Council on Historic Preservation's implementing regulations for Section 106 of the NHPA. Various sections of Part 800 provide direction on how historic properties (those eligible for listing in the National Register) be identified, and how effects to historic properties be assessed in conjunction with the State Historic Preservation Officer (SHPO) and Advisory Council. 36 CFR Part 800 also provides criteria for assessing adverse effects to historic properties and for consulting on properties inadvertently discovered during undertakings; regulations regarding emergency undertakings; and guidance for entering into programmatic agreements and for coordinating with other authorities, partners, and consulting parties.

Bureau of Land Management (BLM), National Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers (2012) provides program-level directives for implementing Section 106 of the National Historic Preservation Act in consultation with SHPO. The national BLM PA streamlines or exempts application of implementing regulations 36 CFR 800 for certain undertakings and guides SHPO participation and review in the BLM land use planning process.

A National Programmatic Agreement (PA) among the BLM, the Advisory Council on Historic Preservation (ACHP), and the National Conference of State Historic Preservation Officers (NCSHPO) sets forth the manner in which the responsibilities deriving from the NHPA shall be met (BLM, 2012). The NHPA describes the process for identifying and evaluating historic properties, for assessing the effects of Federal

actions on historic properties, and for consulting to avoid, reduce, or minimize adverse effects. The term "historic properties" refers to cultural resources that meet specific criteria for eligibility for listing on the National Register of Historic Places (NRHP). Potential adverse effects to historic properties must be considered during the course of any Federal action.

In carrying out its responsibilities both under the PA and statutory authorities, the BLM has also developed policies and procedures through its directives system (BLM Manual Series 8100-8170) to guide BLM's planning and decision making as it pertains to historic properties and preservation. In addition, pursuant to the PA, a 2014 *State Protocol Agreement* has been developed providing direct guidance for the management of cultural resources within the CCFO Planning Area (BLM, 2014).

Eligibility determinations are usually completed as part of project impact assessments or proactive NRHP listing actions. As a result, unless a specific action necessitates this determination; all cultural sites are generally treated as if they are eligible historic properties and afforded the associated emphasis on preservation through avoidance of any potential adverse effect. If a cultural resource is evaluated and does not meet the criteria identified for eligibility under the NHPA, it is not recognized as an historic property and as a result it is not commonly managed for preservation. A similar process applies to the assessment of the eligibility of a TCP.

At an area-wide level, the BLM manages cultural resources through the categorization of evaluated cultural resources according to their nature and relative preservation value. These use categories include scientific use, conservation for future use, traditional use, public use, and experimental use or those resources discharged from management (Table 3.15-1).

Table 3.15-1. Cultural Resource Use Allocations and Desired Outcomes

Use Allocation	Desired Outcome
Scientific use	Preserved until research potential is realized
Conservation for future use	Preserved until conditions for use are met
Traditional use	Long-term preservation
Public use	Long-term preservation, on-site interpretation
Experimental use	Protected until used
Discharged from management	Ineligible cultural resources; no use after evaluation/recordation; not preserved

BLM cultural resource management also identifies specific geographic areas which contain significant cultural resources for additional protective measures. These decisions are based on the presence of known cultural resources, a probability for unrecorded significant resources, imminent threats from natural or human-caused deterioration, or potential conflict with other resource uses.

3.15.3 Regional Setting

The CCFO Planning Area is located in west-central California and encompasses all or part of 12 counties extending southward from Contra Costa, San Francisco, and San Joaquin Counties in the north to Monterey, San Benito, and Fresno Counties in the south. Within this region, the BLM manages approximately 270,000 acres of subsurface mineral estate underlying Federal surface land and 588,000 acres of subsurface mineral estate underlying privately owned land, otherwise referred to as "split estate" lands.

Pre-Contact Era Resources

The diverse land area managed by the CCFO encompasses a vast, resource-rich portion of central California containing many hundreds of prehistoric archaeological sites reflecting an occupation of more than 6,000 years and a diversity of site types throughout the interior as well as along the coast. Though few studies have been conducted for land under the jurisdiction of the CCFO, archaeological data has been

collected from sites in the Southern Santa Clara Valley, the Monterrey Bay area, the south-central coast of California in San Luis Obispo County, and the great Central Valley which largely consists of the western flanks of the San Joaquin Valley for this review. All of these provinces are within the overall boundaries of the Planning Area and contribute to a general overview of the region's prehistory (see BLM, 2007). For example in the southern Santa Clara Valley, King and Hickman (1973) concluded that larger occupation sites were concentrated at the mouths of canyons and to a lesser extent along marsh margins and in upper canyon settings. These sites were thought to represent permanent or near-permanent population centers strategically situated near freshwater and a range of subsistence resources. Smaller occupation sites appear more variable in location, occurring most often in upper canyons and around the marsh, and were interpreted as temporary camps established to exploit particular canyon (e.g., acorns) and marsh (e.g., waterfowl) resources. Special-use loci were found predominately near large occupation sites in upper canyon contexts, typically taking the form of milling stations and artifact scatters. While it is likely that the CCFO Planning Area and the greater Central Valley have been populated for approximately 12,000 years, very few archaeological sites have been found that date before 5,000 years ago. The evidence for early human use is likely deeply buried in the valley alluvial sediments that accumulated rapidly during the later Holocene epoch. Moratto (1984) estimates an accumulation of up to 10 meters of sediments in the lower reaches of the Sacramento River drainage during the last 5,000 to 6,000 years.

As of 1984, approximately 6,000 acres of public lands were inventoried to a BLM "Class III" level (e.g., complete survey coverage of a given area), covering approximately 2 percent of the total Decision Area at that time. Ninety sites were recorded in at least two Management Areas, 53 of which were found potentially eligible for listing in the National Register of Historic Places. Locational data are available but are contained on confidential, individual archaeological site records. Sites were identified from the late prehistoric period, the ethnographic period, and the historic period. Prehistoric sites include small and large occupation sites with midden, temporary camp sites, rock shelters, rock art/ceremonial sites, bedrock mortar outcrops (BRMs), and lithic scatters. Archaeological excavations within the CCFO Planning Area have been few thus contributing very little to the knowledge of the prehistoric period.

From 1984 to 2006, approximately 451 additional archaeological sites had been recorded throughout the four management areas of the CCFO. Only a few sites have been evaluated, and most are assumed eligible for the National Register until they are formally evaluated. Moreover, the CCFO's BLM lands exchange program was able to inventory approximately 86,000 acres for cultural resources, with negative findings on nearly 53,000 acres. The presence of cultural resources on the remaining 33,000 acres resulted in the BLM retaining approximately 1,340 acres of the proposed exchange land specifically because of its high cultural resource value. Pre-contact archaeological resources withheld from exchange included a prehistoric midden site containing human remains. The number of sites in these 1,340 acres is unknown.

Ethnographic Period Tribal Groups

Native California ethnographic tribal groups within the Planning Area include Northern and Southern Valley Yokuts, Salinan, Esselen, Costanoan/Ohlone, and Bay Miwok (Baumhoff, 1963; Bean, 1991; Breschini et al., 1983; Breschini and Haversat, 1993; Cook, 1955; Galvin, 1968; Hester, 1978; Jones et al., 2007; Kroeber, 1925, 1939; Levy, 1973, 1978; Milliken and Johnson, 2003; Wallace, 1978). Although no federally recognized tribal governments are based within the CCFO Planning Area boundary, the Tachi Yokuts Tribe of Santa Rosa Rancheria in Lemoore (Kings County) ranged within the foothills of the western San Joaquin Valley and the Diablo Range during the prehistoric and ethnographic periods. The CCFO consults with the Tachi tribe as undertakings or proposals have the potential to affect their ancestral lands. Several non-federally recognized tribes, groups, and individuals are recognized by the State of California with associations to the area, and the CCFO consults with these groups/individuals as BLM policy dictates. CCFO also contacts the California Native American Heritage Commission when projects have the potential to impact Native American archaeological sites, native material collection areas, or places of spiritual value.

Historic Era Resources

Spanish explorer Juan Rodriguez Cabrillo began exploring the Alta California coastline in 1542 and was the first to explore the bay he named La Bahia de los Pinos in Monterey. Juan Bautista de Anza explored the interior of California from Sonora, Mexico, to San Francisco from 1774 to 1776. Anza led approximately 240 persons from Mexico, through Arizona, and into central California. Anza's route has been designated as the Anza National Historic Trail (BLM, 2015a). The mission system was established by the Catholic Church in cooperation with the Spanish government as a program of settlement and development (colonization) that spread from Baja California to Alta California. The following missions are located within the CCFO Planning Area: San Miguel Arcángel; San Antonio de Padua; Nuestra Señora de la Soledad; San Carlos Borromeo de Carmelo; San Juan Bautista; Santa Cruz; Santa Clara de Asis; San José; San Francisco de Asis; San Rafael Arcángel; and San Francisco Solano (Ruscin, 1999). Mission Delores is also located within the Planning Area. The missions were situated 1-day's travel apart, and were connected by El Camino Real, or the "Kings Highway." The mission system ushered in many changes in indigenous demographics, land use patterns, traditional practices, and the resulting archaeological site types (Cook, 1943a, 1943b, 1960; Eargle, 1986; Jackson and Castillo, 1995; Kroeber and Heizer, 1970; Merriam, 1955). In addition to the missions, the Spanish government established pueblos and presidios to further colonization efforts in Alta California including the City of Monterey (City of Monterey, 2015). By the end of the nineteenth century, disease, and subjugation had decimated the Native American people.

The rancho land grant system, established in 1833, persisted in Alta California until the culmination of the Mexican-American War in 1848, when Mexico ceded California to the United States through the Treaty of Guadalupe Hidalgo (Robinson, 1948). A large gold deposit was discovered that year in the mountains east of Sacramento, resulting in a massive Euro-American population boom in California. In order for the U.S. government to claim ownership of the natural resources located within Alta California, California was established as a state in 1850. Prior to being granted statehood, California was divided into 27 counties. Many of these original counties are located within the CCFO Planning Area.

Subsequent Anglo settlement in the nineteenth century in the Planning Area focused on ranching based on cattle and sheep grazing, agricultural growth focused initially on grain production, shipping, and coal and mercury mining (Chasteen, 2010; Fowkes and Iddings, 2008; Starr, 2005). The subsequent twentieth century developments in petroleum production in the Planning Area such as from oil fields near Coalinga, Jacalitos Valley, San Ardo, and Vallecitos and large-scale row crop agriculture based on improved irrigation and road transportation were highly significant in shaping the economic development and demographic history of the Planning Area (BLM, 2013; Jackson and Armstrong, 2008:12; Latta, 1949; Rintoul, 1990). Historical period site types found in the region reflect these emphases, including oil field development as well as, agriculture and ranching.

In regard to ranching, the Taylor Grazing Act of 1934 was intended to stabilize the livestock industry dependent upon the public range and to prevent overgrazing and promote soil stabilization (BLM, 2015b). Portions of the CCFO Planning Area were located within District No.1 of the lands included in this act. The BLM was established in 1946 through the merger of the Government Land Office (GLO) and the U.S. Grazing Service. The GLO was created in 1812 to manage public lands (BLM, 2015c). Around 1976, a field station was established from the Folsom District Office, and was soon moved to Park Hill, Hollister. The CCFO is one of several BLM field offices in California, and manages energy, planning, fire, grazing, recreation, National Conservation Lands, minerals, abandoned mines lands, wildlife, and more in central California. The Fort Ord National Monument, the Coalinga Mineral Springs National Recreational Trail, the Juan Bautista de Anza National Historic Trail, and California Coastal National Monument were located within the CCFO's jurisdiction in 1996.

3.15.4 Current Conditions and Trends

To identify current issues and concerns regarding cultural resources in the CCFO Planning Area, letters were sent to the following government agencies and historical societies:

- California Historical Society
- Pacific Railroad Society
- Alameda County Historical Society
- Livermore Heritage Guild, Attn: Jeff Kaskey, President
- Contra Costa County Historical Society, Attn: Scott Saftler, President
- Clayton Historical Society
- Concord Historical Society
- Fresno City and County Historical Society
- R.C. Baker Memorial Museum, Inc.
- Monterey County Historical Society
- Boronda Adobe History Center
- Big Sur Historical Society
- San Benito County Historical Society
- San Juan Bautista Historical Society
- San Mateo County History Museum
- The Museums of Los Gatos, Attn: Amy C. Long, History Curator
- Morgan Hill Historical Society
- San Lorenzo Valley Museum
- Scotts Valley Historical Society
- Pajaro Valley Historical Association
- Alameda County, Planning Department
- Contra Costa County, Department of Conservation and Development, Attn: John Kopchik, Director
- Fresno County, Department of Public Works and Planning
- County of Madera, Building Division
- Merced County, Planning Department, Attn: Mark J. Hendrickson, Directory
- Monterey County, Planning Department
- San Benito County, Planning, Building Inspection Services, and Code Enforcement Department
- City and County of San Francisco, Planning Department
- San Joaquin County, Community Development Department
- San Mateo County, Department of Planning and Building
- Santa Clara County, Department of Planning and Development
- Santa Cruz County, Planning Department
- Stanislaus County, Planning and Community Development

Other sources consulted include the list of nominated historic properties in the National Register of Historic Places maintained by the California Office of Historic Preservation.

Also, a review of BLM records for the CCFO Planning Area and interviews with key staff was conducted at the BLM Central Coast Field Office in Hollister, California. The purpose of the visit was to perform an information search of any cultural, paleontological, and built environment resources the Field Office had for surface and split-estate BLM lands within the Planning Area. The review confirmed no built environment records exist for the BLM surface lands. All recent BLM cultural investigation reports for surface lands were reviewed in digital and/or hard copy form. The results of this research informed the following discussion of expected historical property types.

Since very few cultural resource investigations have occurred on BLM surface lands since 2009, 10 split estate areas were targeted for a California Historic Resources Information System (CHRIS) data search. Descriptions of the targeted split-estate lands were submitted to the Northwest Information Center at

Sonoma State as well as the Southern San Joaquin Valley Information Center at CSU Bakersfield. Submission materials included a 1:24,000 scale topographic USGS map with the requested search area outlined, location information, and county for each search map. Digital shapefiles of the search areas were also submitted to the Information Centers. Requested search areas were in Fresno, Contra Costa, San Benito, Monterey, San Mateo, and Santa Clara Counties.

Results of the CHRIS and BLM reviews within the CCFO Planning Area are provided below, organized by county. Included are results from the CHRIS searches by submitted map as well as reports and resources received from BLM.

Contra Costa County

A CHRIS records search conducted for a 575-acre parcel resulted in no known archaeological sites or investigations within the search area (see Map 1).

Monterey County

A CHRIS records search for a 795-acre parcel identified three previous investigations within the search area. One investigation, a field reconnaissance of less than an acre of land in Big Sur, was negative for prehistoric and historic resources (Doane and Breschini, 2008). The second investigation involved a survey after a wild fire on national wilderness and state park lands in the Big Sur area in 2008. No cultural resources were described or mapped during the investigation (Dallas, 2008). The third investigation involved a field survey of less than an acre of land in Big Sur California for the replacement of a cattle guard. Results were negative for prehistoric and historic resources (Doane and Breschini, 2014) (see Map 7).

A second CHRIS records search for a 1,550-acre parcel identified one previous investigation of approximately 160 acres in Rancho San Lucas with negative results for prehistoric and historic resources (Smith and Breschini, 1989) (see Map 8).

A third CHRIS records search for a 2,820-acre parcel resulted in no known archaeological sites or investigations within the search area (see Map 9).

In 2008, the Central Coast Field Office performed environmental assessments of 80 acres of public land in the Copperhead 1 and 2 areas and 40 acres of public land in the Portuguese Canyon area to assess the land for eligibility for public sale; no archeological or cultural resources were identified within the parcels (BLM, 2008).

Fresno County

A CHRIS records search for a 2,210-acre parcel identified recorded resources including one prehistoric temporary campsite with bedrock mortars and two discrete lithic scatters (CA-FRE-2523). No cultural resource investigations had been conducted within the search area (see Map 10).

Santa Clara County

A CHRIS records search conducted for a 1,310-acre parcel identified one previous investigation consisting of background research and a field survey of a road alignment area to be constructed identified no cultural resources within the investigation area (Busby, 2003) (see Map 4). A second CHRIS records search for a 575-acre parcel revealed one previous investigation, a cultural resources evaluation including archival research and a survey of 4 acres, that found no cultural resources (Cartier, 2005) (see Map 3).

To assess the eligibility of public land parcels for sale, the BLM conducted environmental assessments of 9.21 acres in the Loma Prieta area, 65.65 acres in the Upper Uvas area, 40 acres in the Waterman Creek area, 15.97 acres in the Pacheco Peak area, and 23.60 acres in the Uvas Creek area; the five assessments resulted in negative findings for significant cultural resources (BLM, 2008).

San Benito County

A CHRIS records search for a 1,460-acre parcel revealed one previous investigation which was a mixed strategy reconnaissance of approximately 2,000 acres in Monterey, San Benito, and Fresno Counties (Breschini and Haversat, 1991). Results were negative for prehistoric and historic resources within the current search area (see Map 5). A second CHRIS records search for a 1,120-acre parcel also resulted in no known archaeological sites or investigations within the search area (see Map 6).

In 2008, the Central Coast Field Office performed an environmental assessment of: 15.61 acres of public land in the San Benito River area to assess the land for eligibility for public sale; no archeological or cultural resources were identified within the parcel (BLM, 2008).

BLM records indicate one large scale archaeological reconnaissance investigation was performed on approximately 11,000 acres, 420 acres of which are BLM-administered surface lands. The inventory was to identify cultural resource locations which could be affected by drilling associated with seismic testing as part of the 3D Seismic Testing project in the Vallecitos area. Findings included two prehistoric sites, one historic residence with related machinery, and one historic isolate. One previously recorded prehistoric archaeological site (CA-SBN-128) and one previously recorded historic site (CA-SBN, 248H) were relocated (Jackson and Armstrong, 2008).

Santa Cruz County

An environmental assessment of 12.55 acres of public land by BLM in the Ramsey Gulch area to assess the eligibility of land for public sale revealed no known archeological or cultural resources within the parcel (BLM, 2008).

San Mateo County

A CHRIS records search for a 375-acre parcel identified two previous investigations within the search area. One investigation was an archaeological evaluation and assessment of a shell midden site referred to as the Redwood Chiton site, located within the Santa Cruz Mountains. The site was recommended significant (Dillon, 1992). The second investigation was an archaeological survey of 90 acres in San Mateo County resulting in no cultural resources being found (Reynolds, 2004) (see Map 2).

An environmental assessment of 40 acres of public land by BLM in the Butano Creek area to assess the land for eligibility for public sale indicated a negative occurrence of cultural resources.

Based upon the above search results, insufficient data is available to develop projections of potential archaeological and built environment site types including their densities and locations in the CCFO Planning Area.

Historic Era

In a further effort to identify built environment resources, a review of historical records was conducted including historical aerial photographs, historical and quadrangle maps, available literature, local historical information, and relevant historic context narratives pertaining to patterns of historic-era settlement. The following historic-era property types are expected to be located within the CCFO Planning Area. For purposes of this assessment historical architectural resources are any buildings or structures older than 45 years of age, or constructed in or before 1970.

- **Adobes.** Adobes constructed during the early agricultural period of California's history share one commonality: they were constructed using sun backed bricks made from mud, called adobe. The surviving examples of this building type are typically rectangular in plan with side-gabled roofs with deep overhangs to provide shade. Early examples had had window openings that were protected with animal hides. Glass was expensive, and glass windows were until the nineteenth century. The exposes adobe

brick walls were often whitewashed with lime to protect the bricks from insects. The interior of the buildings were open to maximize airflow. The early adobes were Cliff May's inspiration for designing the modern Ranch style populated throughout California and the nation in numerous real estate tract developments. Historic-period adobes are known to be located within the CCFO's jurisdiction. The Gutierrez (Candido) Adobe in San Pablo is noted under the government theme (DPR, 1976).

- **Homesteads.** Early examples of homesteads may contain residences, barns for storing animals, grains, or equipment, and other ancillary buildings, such as privies. It is likely this resource type is no longer inhabited, and may be considered an archaeological site.
- **Ranches.** Early examples of ranches often contain adobe residences. Other expected building types are barns for storing equipment, hay, and animals; cisterns for storing water; and wood fenced corrals and open fields for grazing animals. The residences on the ranches may reflect a variety of architectural styles including Craftsman or may be vernacular and reflect local trends and tastes instead of a defined style of architecture. Historic-period ranches are known to be located within the CCFO's jurisdiction. The Railroad Ranch in Oakwood is noted under economic and industrial themes (DPR, 1976).
- **Wineries.** Wineries and table grapes farms were and are common throughout this region of California. Early wineries may have been dry farmed, but cisterns for water storage for irrigation purposes are expected. Other expected elements of a winery are barns for storing equipment and casks of wine, other associated ancillary buildings, trellises for growing the grapes, and fencing to protect the vines from wildlife. A defined style of architecture is not associated with this property type. Historic-period wineries are known to be located within the CCFO's jurisdiction. An example of a historic winery is the Mt. Diablo Winery located on Marsh Creek Road (Northwest Information Center, 1989).
- **Depots.** The influx of stagecoach and rail lines is noted as an important event in the State of California, and depots were built throughout the State. Stagecoach depots could range from an established post office to a building designated for this purpose. Railroad depots are located adjacent to rail lines, and were often located in the center of towns. Railroad depots generally reflect the architectural styles that were popular during their period of construction, and can include Folk Victorian, Craftsman, and Moderne style buildings. Historic-period depots are known to be located within the CCFO's jurisdiction. The Pioneer Inn, Main Street, Clayton, is an example of a stagecoach stop on the route from Oakland to Stockton (Northwest Information Center, 1989). The ferry landing near Crockett is noted under economic and industrial themes (DPR, 1976).
- **Ferry Landings.** Prior to the construction of modern paved roads and bridges, ferries were necessary for crossing bodies of water. Tolls were paid for the use of this service, and towns often grew up around successful ferry landings. Ferry landings historically consisted of two docks facing each other on opposing banks of a river, stream, or other navigable body of water. Historic-period ferry landings are known to be located within the CCFO's jurisdiction, and include the ferry landing at the mouth of Alhambra Creek near Crockett in Contra Costa County (DPR, 1976).
- **Rail Lines.** Though active rail lines generally do not retain integrity because the gauge, ballast, and ties are replaced frequently, historically significant rail routes are known to be located in the footprint of the undertaking.
- **Roads.** Though actives roads generally do not retain integrity due to repaving, widening, or other modernization improvements, historically significant vehicular transportation routes are known to be within the boundary of this undertaking.
- **Canals and Irrigation Systems.** The California Aqueduct was previously found to appear eligible for listing in the National Register of Historic Places and is located within the Planning Area. Numerous historic-period feeder canals and irrigation ditches are also located within the area and may be significant.

- **Oil Wells.** Numerous historic-period oil wells are known to exist within the CCFO Planning Area. Abandoned or capped oil wells are considered to be archaeological resources.
- **Mines.** Numerous historic-period mines are known to exist within the CCFO Planning Area. Mining activities included extraction of precious metals, minerals, and mercury (quicksilver). Abandoned mines are considered to be archaeological resources. An example of a historic mine is the copper and silver mines located on Mitchell Canyon Road, Mt. Zion (Northwest Information Center, 1989).
- **Logging Camps.** Logging camps may include residential cabins, a company store, and buildings to house milling equipment. It is likely the historic-era logging camps are no longer and use, and would qualify as an archaeological site. The Moraga Lumber Mill Site in Moraga is noted under economic and industrial themes (DPR, 1976).
- **Residential/Commercial/Institutional Architecture.** Lastly, numerous historic-period residential buildings are known to be located within the CCFO's jurisdiction. The expected styles range from adobes to Queen Anne to Craftsman, and include post-war housing tracts with Ranch style residences. Numerous commercial and institutional buildings, such as schools, were also built in the Ranch style. The La Cocotte Restaurant, originally constructed as a residence, is an example of a turn-of-the-century early western with false parapet building (Northwest Information Center, 1989).

To evaluate historic-era cultural resources sensitivity within the CCFO Planning Area, an assessment was conducted to predict where significant built environment resources may be found and to estimate the density of historic period architectural resources for the Planning Area. No fieldwork was conducted as part of this analysis. The analysis focused on the identification and future evaluation of any previously identified historical architectural resources within the Planning Area, should they exist. The density of development was used as an indicator of the number of potential resources that would require field survey when specific surface disturbing projects are proposed.

The sensitivity assessment indicates the expected density of historical property types for these regions including homesteads, ranches, wineries, rail lines, roads, oil wells and mines, logging camps, and recreational cabins would be very low. In addition, the mineral leases subject to Settlement Agreement are largely located within forested and undeveloped mountainous areas. The records search did not identify resources specifically located on the 14 parcels subject to the Settlement Agreement. Because the lease areas, as well as the CCFO Planning Area in general, are less than 10 percent developed during the historic period, any future proposed undertakings have a low sensitivity for impacting historical architectural resources for all five alternatives.

3.16 Paleontological Resources

As described in the Bureau of Land Management's (BLM's) Manual and Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management (BLM, 1998a, 1998b, 2007a, 2008), the BLM's objectives for paleontological resource management is to manage scientific, educational, and recreational values, and to mitigate adverse impacts. These objectives are met through land use planning processes that include:

- Identifying areas and geological units (e.g., formations, members) containing paleontological resources;
- Evaluating the potential of areas to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils;
- Developing management recommendations (including mitigation measures in specific locations) to promote the scientific, educational, and recreational uses of fossils on public lands and mitigate resource conflicts; and
- Developing strategies to regularly monitor public lands where important paleontological localities have been identified (BLM, 2007b, 3-14.1).

3.16.1 Introduction

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the evidence of once-living organisms preserved in the rock record. They include the fossilized remains of ancient plants and animals and the traces thereof (e.g., trackways, imprints, burrows, etc.). In general, fossils are considered to be greater than 5,000 years old (middle Holocene) and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks under certain conditions (Society of Vertebrate Paleontology [SVP], 2010, 2). Paleontological resources can provide important taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data (Scott and Springer, 2003, 6:8).

Approach to Data Collection

Paleontological resources are not found in "soil" but are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, in order to ascertain whether or not a particular study area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature and geologic mapping to determine the geology and stratigraphy of the area. Further, to delineate the boundaries of an area of paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit because paleontological sensitivity is not limited to surface exposures of fossil material.

To determine whether fossil localities have been previously discovered within the project area or within a particular rock unit, relevant scientific literature and published geologic maps were reviewed. In addition, a review of recent discoveries and paleontological localities identified in the CCFO Planning Area since 2007 was conducted using records on file with the BLM field office in Hollister, California.

Bureau of Land Management Significance Criteria

Emphasis for evaluation of the significance of fossils is placed on uniqueness, whether fossils are in stratigraphic context that contribute to the body of paleontologic knowledge, and whether fossil occurrences may individually have low significance but contribute individually or collectively to the body of data that allows resource management and resource preservation. In addition, the public benefits and public expectations arising from a fossil's scientific, recreational, and educational values are evaluated (BLM, 2007a, 3.14-1).

The BLM (2008) defines a significant paleontological resource as follows:

> *Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research* [1-18].

Bureau of Land Management Potential Fossil Yield Classification (PFYC)

Geologic units are considered to be "sensitive" if they are known to contain scientifically significant paleontological resources anywhere in their extent. The area of sensitivity is typically defined as the entire rock unit (formation or member thereof) and not limited to areas where surface fossils may be exposed. Using baseline information gathered during a paleontological resource assessment, the sensitivity of the geologic unit(s) underlying a project area can be assigned to one of five classifications (Classes 1 through 5) defined by the BLM (2007b, Attachment 1-1:1-4). These categories include very high, high, moderate or unknown, low, and very low potential for fossilized remains. The criteria for each sensitivity classification and the corresponding mitigation recommendations are provided in Table 3.16-1.

Table 3.16-1. Paleontological Sensitivity Categories

Potential Fossil Yield Classification (PFYC)	Criteria	Mitigation Recommendations
Class 1: Very Low	Rock units that are formed under or exposed to immense heat and pressure, such as high-grade metamorphic rocks and plutonic igneous rocks; volcanic rocks, excluding reworked ash deposits; Precambrian age or older rocks. The probability for impacting any fossils is negligible because significant fossils are non-existent or extremely rare.	Management concern for paleontological resources is usually negligible or not applicable. Mitigation not required, except under very rare or exceptional circumstances.
Class 2: Low	Sedimentary rock units that have yielded few, if any, vertebrate fossils or significant invertebrate fossils in the past, based upon review of available literature and museum collections records. Geologic units of low potential also include those that yield fossils only on rare occasion and under unusual circumstances; eolian deposits, rock units deposited less than 10,000 years before present; and deposits that exhibit a high degree of diagenetic alteration.	Management concern for paleontological resources is generally low. Mitigation is not typically required.
Class 3a: Moderate Class 3b: Unknown	A fossiliferous rock unit with moderate potential is a sedimentary deposit where the significance, abundance, and predictability of recovery of fossils vary. In some cases, available literature on a particular geologic unit will be scarce and a determination of whether or not it is fossiliferous or potentially fossiliferous will be difficult to make. Under these circumstances, the sensitivity is unknown and further study is needed to determine the unit's paleontological resource potential. Examples include, marine units with uncommon vertebrate fossils, such as sharks teeth or fish scales, or terrestrial units with inconsistent significant fossils or widespread and well-known plant remains	Management concern for paleontological resources is moderate or cannot be determined from existing data. Due to the unknown potential, and moderate or infrequent occurrence of fossils, surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action. Management recommendations may include a preconstruction field survey, monitoring, or avoidance.

Table 3.16-1. Paleontological Sensitivity Categories

Potential Fossil Yield Classification (PFYC)	Criteria	Mitigation Recommendations
Class 4a: High; exposed Class 4b: High; covered	Geologic units with high potential for paleontological resources are those that have been proven to yield vertebrate or significant invertebrate, plant, or trace fossils in the past or are likely to contain new vertebrate materials, traces, or trackways; however, these units may vary in occurrence or predictability, may be obscured by vegetation cover or inaccessible from a road or trail, and may have been degraded by historical fossil-hunting. A unit with high sensitivity is susceptible to surface-disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover as well as those shallowly covered by soil, alluvium, or vegetation.	Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action. Typically, a field survey as well as on-site construction monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated in an approved museum. A final report documenting the significance of the finds will also be required.
Class 5a: Very High; exposed Class 5b: Very High; covered	Geologic units with very high potential for paleontological resources are those that consistently and predictably yield vertebrate or significant invertebrate, plant, or trace fossils. A unit with very high sensitivity is highly susceptible to surface disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover, as well as those shallowly covered by soil, alluvium, or vegetation.	Management concern for paleontological resources in Class 5 areas is high to very high. Typically, a field survey as well as on-site construction monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated in an approved museum. A final report documenting the significance of the finds will also be required.

Source: BLM, 2007b.

The purpose of this RMPA/EIS, as described above, is to provide a description of paleontological resources that can inform on future BLM resource management decisions and mitigation strategies relating to oil and gas development for the CCFO Planning Area. Management concern for paleontological resources contained within geologic units designated PFYC Class 1 or PFYC Class 2 is generally low or negligible. Therefore, consistent with the purpose of this RMPA/EIS, only those geologic units with sufficient management concern and the potential to yield significant fossils are described in this analysis (i.e., PFYC Classes 3, 4, and 5).

3.16.2 Regulatory Framework

Paleontological resources (i.e., fossils) are considered non-renewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under the various Federal, State, and local laws and regulations. Federal laws and regulations apply only when undertakings are located on Federal lands or federally managed lands, or when they are federally funded. BLM actions on split-estate land where the "surface estate not owned or administered by BLM should be conditioned with appropriate paleontological mitigation recommendations to protect the interests of the surface owner; however, in most states, the surface owner may elect to waive these recommendations" (BLM, 1998b, III-4). The BLM has set forth guidelines for the management of paleontological resources in BLM Instruction Memorandum (IM) No. 2009-011 (2008, Attachment 1-1:1-19), Handbook (H) 8270 (BLM, 1998a, 01: 09F1b), and H-8270-1 (BLM, 1998b, I-1:v-2). This paleontological assessment complies with these guidelines as well as professional standards set forth by the SVP (2010, 1:6).

The Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act (PRPA) (16 United States Code [USC] 470aaa et seq.) was enacted as a result of the passage of the Omnibus Public Lands Management Act (OPLA) of 2009 (Public Law 111-011, Title VI, Subtitle D). The OPLA-PRPA requires Federal land management agen-

cies to manage and protect paleontological resources on Federal lands and affirms the authority of existing policies and guidelines already in place (BLM, 2012, 2:3). As a result of the recent enactment of the OPLA-PRPA, Federal agencies will begin developing "appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources in accordance with applicable agency laws, regulations, and policies" (OPLA Section 6302[a]). Specifically, implementation of the OPLA-PRPA shall include programs which increase public awareness of paleontological resources, govern collection of paleontological resources and curation, define illegal activities (e.g., unauthorized excavation, removal, false labeling, or damage to fossil resources), and set penalties for prohibited acts. Under the PRPA, casual or hobby collecting is allowable on some BLM lands, under certain conditions, consistent with existing policy (BLM, 2007b, Attachment 1-2).

The National Environmental Policy Act of 1969

The National Environmental Policy Act was enacted to promote "efforts which will prevent or eliminate damage to the environment (and)...preserve important historic, cultural, and natural aspects of our national heritage" (National Park Service [NPS], 2006, 101).

Section 102(2)(A) of the NEPA requires that all Federal agencies "utilize a systematic, interdisciplinary approach" to make informed, publicly supported decisions regarding environmental issues (NPS, 2006, 102). Section 102 also specifies the cooperation of agencies to:

> *(B) Identify and develop methods and procedures, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations;*
>
> *(C) Include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on —*
>
> *(i) The environmental impact of the proposed action,*
>
> *(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented,*
>
> *(iii) Alternatives to the proposed action,*
>
> *(iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and*
>
> *(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.*
>
> *(E) Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources* [NPS, 2006, 102;103]

Federal Land Policy and Management Act of 1976 (43 USC 1701–1782)

The Federal Land Policy and Management Act requires that public lands be managed in a manner that will protect the quality of their scientific values. It was established as a public land policy to "provide for the management, protection, development, and enhancement of the public lands" (BLM and Office of the Solicitor, 2001, iii). The FLPMA requires Federal agencies to manage public lands so that environmental, historic, archeological, and scientific resources are preserved and protected, where appropriate. Although the FLPMA does not refer specifically to fossils, the law does protect scientific resources, which includes significant fossils, including vertebrate remains.

The FLPMA regulates the use and development of public lands and resources through easements, licenses, and permits. The law requires that public lands be inventoried so that the data can be used to make informed land-use decisions and requires permits for the use, occupancy, and development of the certain public lands, including the collection of significant fossils for scientific purposes.

Code of Federal Regulations, Title 43 (43 CFR 8365.1-5)

Under the Title 43, Code of Federal Regulations, Section 8365.1–5, the collection of scientific and paleontological resources, including vertebrate fossils, on Federal land is prohibited. The collection of a "reasonable amount" of common invertebrate or plant fossils for non-commercial purposes is permissible (GPO, 2014, 989).

The Archaeological and Historic Preservation Act of 1974 (16 USC 469-469c)

In 1974, this act amended and expanded the Reservoir Salvage Act of 1960; this law provides data preservation through the survey, recovery, and preservation of significant scientific, prehistoric, historic, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a Federal, federally licensed, or federally funded project (BLM, 2007a, 3.14-1).

The Mineral Leasing Act of 1920 (Section 30)

This law provides for protection of the interests of the United States. Natural resources, including paleontological resources, are generally considered as such interests. The BLM, as lead Federal agency for issuance of grants of right-of-way on Federal lands under Section 28 of the Mineral Leasing Act, also addresses requirements for protection of paleontological and other natural and cultural resources as conditions for these grants (BLM, 2007a, 3.14-2).

3.16.3 Regional Setting

Geologic Background of the Central Coast Field Office Planning Area

The CCFO Planning Area is situated within the Coast Ranges and Great Valley (i.e., Central Valley) geomorphic provinces of California. The geology of the Coast Ranges and Central Valley is exceptionally diverse, and although their geomorphology is distinctly different, the two provinces share a common geologic history. The region of the present-day Coast Ranges and Great Valley was covered by marine waters through the Mesozoic and into the Cenozoic. During this time, forearc (i.e., the deep marine region between a volcanic arc and the associated subduction zone) marine and nonmarine shale, sandstone, and conglomerate of the Cretaceous Central Valley Sequence were deposited coincident with the accretion of the Franciscan Assemblage onto the continental margin of North America during the subduction of the Farallon Plate (Bartow and Nilsen, 1990, 6). Through the Upper Cretaceous and much of the Cenozoic, unconformable marine continental shelf sedimentary rocks were deposited above the Great Valley Sequence within the actively subsiding Central Valley region. As of the Late Miocene to the Late Pliocene, most of the marine waters in the Great Valley were drained and an orogenic (i.e., mountain-building) episode occurred in the vicinity of the present-day Coast Ranges, resulting in their uplift above sea level (Weissmann et al., 2005, 169:172). Subsequently, from the Late Pliocene to Holocene, extensive deposits of terrestrial material, including alluvial fans and fluvial sediments, were deposited in the Great Valley and southern Coast Ranges (Norris and Webb, 1976, 2:3). Tectonic activity and extensive faulting continued to occur during the Quaternary period, further uplifting and deforming the Coast Ranges.

3.16.4 Current Conditions and Trends

Geology and Paleontology of the Major Fossil-Bearing Units in the Central Coast Field Office Planning Area

The major significant fossil-bearing units underlying the CCFO Planning Area are described below and are listed in Table 3.16-2 (Graymer, 1996; Jennings, 1958; Jennings and Strand, 1958; Koenig, 1963; Strand and Koenig, 1965; University of California Museum of Paleontology [UCMP], 2015).

Table 3.16-2. Major Fossil-Bearing Units in the Central Coast Field Office Planning Area

Geologic Unit	Age	Typical Fossils	Preliminary[1] Potential Fossil Yield Classification
Franciscan Assemblage	Jurassic to Cretaceous	Reptile, invertebrate, plant	PFYC 3a
Panoche Formation (Great Valley Sequence)	Cretaceous	Reptile, invertebrate, plant	PFYC 3a to 4
Moreno Formation (Great Valley Sequence)	Cretaceous	Reptile, invertebrate, plant	PFYC 4 to 5
Laguna Seca Formation[2]	Late Paleocene to Early Eocene	Invertebrate, plant	PFYC 2*
Martinez Formation	Paleocene to Eocene	Vertebrate, invertebrate	PFYC 3a to 4
Lodo Formation	Late Paleocene to Early Eocene	Vertebrate, invertebrate, microfossil	PFYC 3a to 4
Domengine Formation	Middle Eocene	Shark, fish, invertebrate, microfossil	PFYC 3a
Avenal Sandstone	Early to Middle Eocene	Vertebrate, invertebrate, microfossil	PFYC 3a
Kreyenhagen Formation (including the Tumey Sandstone)	Eocene	Vertebrate, invertebrate, microfossil	PFYC 3a to 5
Markley Formation	Late Eocene	Fish, invertebrate, microfossil	PFYC 3a to 4
Temblor Formation	Oligocene to Early Miocene	Marine mammal, terrestrial mammal, shark, bony fish	PFYC 4 to 5
Vaqueros Formation	Early Miocene	Marine mammal, terrestrial mammal, shark, invertebrate	PFYC 4 to 5
Lompico Formation	Middle Miocene	Vertebrate, invertebrate	PFYC 3a
Monterey Group	Middle to Late Miocene	Marine mammal, terrestrial mammal, shark, bony fish, plant, microfossil	PFYC 5
Briones Formation (San Pablo Group)	Late Miocene	Large land mammals, reptile, fish, birds, sharks, invertebrates	PFYC 4
Cierbo Formation (San Pablo Group)	Late Miocene	Vertebrate, invertebrate	PFYC 3a
Neroly Sandstone (San Pablo Group)	Late Miocene	Vertebrate: beaver, deer, rodent, horse; invertebrate	PFYC 4

Table 3.16-2. Major Fossil-Bearing Units in the Central Coast Field Office Planning Area

Geologic Unit	Age	Typical Fossils	Preliminary[1] Potential Fossil Yield Classification
Oro Loma Formation	Late Miocene to Pliocene	Terrestrial mammal	PFYC 4
Santa Margarita Formation	Late Miocene	Marine mammal, terrestrial mammal, shark, bony fish, plant, bird, invertebrate	PFYC 4 to 5
Santa Cruz Mudstone	Late Miocene	Shark, fish, invertebrate, microfossil	PFYC 3a or 4
Jacalitos Formation	Miocene to Pliocene	Vertebrate, invertebrate, microfossil	PFYC 3a or 4
Purisima Formation	Early to Middle Pliocene	Vertebrate, invertebrate, microfossil	PFYC 4 to 5
Tehama Formation	Pliocene	Land mammal, fish, rodent	PFYC 3a
Etchegoin Formation	Pliocene	Vertebrate, invertebrate, microfossil	PFYC 4 to 5
San Benito Gravels	Pliocene to Pleistocene	Vertebrate	PFYC 3a or 4
Irvington Gravels	Pliocene to Pleistocene	Vertebrate, invertebrate	PFYC 4 or 5
Livermore Gravels	Pliocene to Pleistocene	Vertebrate	PFYC 3a
Paso Robles Formation	Late Pliocene to Early Pleistocene	Vertebrate, invertebrate	PFYC 3a or 4
Tulare Formation	Late Pliocene to Early Pleistocene	Mammal, bird, shark, fish, plant	PFYC 4
Merced Formation	Pleistocene	Mammal, bird, shark, fish, invertebrate, microfossil, plant	PFYC 4 to 5
Quaternary Older Alluvium	Pleistocene	Vertebrate	PFYC 3a

Sources: BLM, 2007a; Graymer, 1996; Jennings, 1958; Jennings and Strand, 1958; Koenig, 1963; Strand, 1964
*Denotes low sensitivity; see Note 2.
1 - PFYC recommendation for this RMPA/EIS is preliminary and programmatic. During subsequent site-specific project-level evaluations, these PFYC recommendations may be refined based on local conditions (BLM, 2007b, Attachment 1-1; 1-4).
2 - Although the Laguna Seca Formation has no record of vertebrate localities in the UCMP or Paleobiology databases, the BLM (2007a, 3.14-5) assigned a moderate to high sensitivity to the unit (Condition 2) on the basis of Staebler (1981). Therefore, in accordance with the BLM (2007b, Attachment 2-2), this unit has been assigned a PFYC 3a to 4.

Franciscan Assemblage. The Franciscan Assemblage includes over 55,000 feet of greywacke, shale, greenstone, and bluestone metasedimentary rocks as well as ophiolite sequences, which were originally deposited on an ancient seafloor during the Jurassic to Cretaceous (Norris and Webb, 1976, 252:254). Rocks of the Franciscan Assemblage are exposed throughout the Coast Ranges and have yielded invertebrate and vertebrate specimens from numerous localities throughout the CCFO Planning Area in Alameda, Monterey, San Francisco, San Joaquin, San Mateo, Santa Clara, and Stanislaus Counties. Recovered fossils from the Franciscan Assemblage include the large marine reptiles, *Plesiosaurus* and *Ichthyosaurus*, as well as numerous burrow traces and invertebrate and plant fossils (UCMP, 2015).

Panoche and Moreno Formations of the Cretaceous Great Valley Sequence. The Panoche and Moreno Formations are members of the Great Valley Sequence, which is extensively exposed throughout the CCFO Planning Area. The Great Valley Sequence records a thick (10,000- to 30,000-foot) accumulation of Jurassic to Paleogene marine mudstone and sandstone deposited within a forearc basin flanked by the Sierra Nevada Batholith to the east and the Franciscan Complex to the west (Harden, 1998, 242:249). In the Diablo Range, the Cretaceous Panoche Formation rests unconformably on the Coast Range ophiolite and represents the base of the Great Valley Sequence. The Panoche Formation is up to 3,000 feet thick and consists of laterally variable deposits of gray to brown, moderately to well-bedded, and well-indurated mudstone and siltstone beds with local sandstone and boulder conglomerate lenses (Dibblee and Minch, 2007b and 2007d). The overlying Moreno Formation is up to 1,300 feet thick and was deposited conformably on the Panoche Formation during the Late Cretaceous to Paleocene epochs (Throckmorton, 1988, 5). The Moreno Formation consists of fine-grained sediments and is composed of commonly laminated, gray to brown micaceous shale with subordinate selenite gypsum, limestone lenses, and fine- to medium-grained grayish-tan arkose (Throckmorton, 1988, 9:12). An abundant Cretaceous age flora and fauna has been recorded within the deposits of the Great Valley Sequence (UCMP, 2015). Numerous localities have been recorded within the Panoche and Moreno Formations, which have yielded marine and terrestrial fossils, including specimens of mollusk, foraminifera, diatoms, ammonite, shark, fish, amphibian, large reptile, conifer wood, and the remains of flowering plants (BLM, 2014; Elder and Miller, 1993, 9-16; Haggart and Ward, 1984, 622:625). The remains of several large reptiles have been recovered within the Moreno Formation from within the Diablo Range, including mosasaur, plesiosaur, and dinosaur (Paleobiology Database, 2015). In the Panoche Hills, the nearly fully articulated holotype specimen of the plesiosaur *Morenosaurus stocki* was recovered from within the Moreno Formation. In addition, fossilized wood from the Moreno conifer (*Margeriella cretacea*) has been exceptionally well preserved within the Moreno Formation. Fossilized plant remains recovered from within the Moreno Formation include taxa of palm, elm, sycamore, magnolia, and shrub (BLM, 2014).

Laguna Seca Formation. The Late Paleocene to Early Eocene Laguna Seca Formation is exposed in the CCFO Planning Area and is unconformable with the underlying Moreno Formation and overlying Domengine Formation. The unit is composed of well-lithified, light gray to tan, massive fine-grained micaceous sandstone and siltstone, local red mudstone, and white kaolinitic sandstone (Bartow, 1996). In addition to well-preserved fossil plant material, the Laguna Seca Formation has yielded several Paleocene to Eocene age invertebrate localities from paralic deposits in the CCFO Planning Area (UCMP, 2015; Paleobiology Database, 2015).

Martinez Formation. The Paleocene to Eocene age Martinez Formation is locally exposed throughout the CCFO Planning Area. The fossiliferous marine unit consists of sandstone, pebble conglomerate, and siltstone and has yielded reptilian and other unspecified vertebrate specimens from localities in Contra Costa County. In addition, the Martinez Formation has yielded numerous invertebrate localities in San Mateo, Fresno, and Merced Counties (UCMP, 2015).

Lodo Formation. The Late Paleocene to Early Eocene age Lodo Formation is exposed within the CCFO Planning Area in Fresno, Merced, and San Benito Counties and is composed of bluish-gray, deep marine mudstone and claystone (Bartow, 1990, 6). The Lodo Formation contains abundant foraminifera microfossils as well as numerous mollusk invertebrate localities and at least one vertebrate locality within Fresno County, which yielded a specimen of Chimaera (cartilaginous fish) (UCMP, 2015).

Domengine Formation. The Middle Eocene age Domengine Formation is intermittently exposed throughout the CCFO Planning Area. The deposit is composed of massive, greenish-grey, medium-grained calcareous sandstone and well-indurated brown conglomeritic sandstone, with medium- to coarse-grained sand and well-rounded pebbles and cobbles (Oakeshott, 1958, 58-89). The Domengine Formation includes the white to light gray pebbly sandstone of the Yokut Sandstone member that forms the base of the unit and unconformably overlies older units, including rocks of the Great Valley Sequence (Prothero, 1991,

45-46). In central and northern California, the Domengine Formation has yielded hundreds of invertebrate and microfossil localities as well as one vertebrate locality in Fresno County, which yielded specimens of shark and bony fish (UCMP, 2015).

Avenal Sandstone. The Early to Middle Eocene Avenal sandstone is composed of massive sandstone and pebble conglomerate with interbedded siltstone and fine-grained, thinly bedded sandstone (National Geologic Map Database [NGMDB], 2015). Numerous mollusk and foraminifera localities have been recovered within the Avenal Sandstone. In addition, at least one vertebrate locality was documented within Fresno County near Coalmine Canyon in the CCFO Planning Area, which yielded unspecified vertebrate specimens (UCMP, 2015).

Kreyenhagen Formation. The Eocene Kreyenhagen Formation conformably overlies the Domengine Formation and is exposed in Contra Costa, Fresno, San Benito, Monterey, Stanislaus, and Merced Counties within the CCFO Planning Area (UCMP, 2015). The unit consists of deep marine sediments composed of white diatomaceous shale, porcelaneous mudstone, and brown argillaceous shale with subordinate interbeds of siltstone and limestone (NGMDB, 2015; Bartow, 1990, 5:7). The Tumey Sandstone Lentil member (previously recognized as the Tumey Formation) forms the stratigraphic top of the Kreyenhagen Formation and is composed of a gray to brown, friable to cemented, locally pebbly lithic sandstone with dominate volcanic clasts (Bartow, 1996). Numerous invertebrate, microfossil, and vertebrate localities have been recovered from within the Kreyenhagen Formation, which yielded unspecified vertebrate remains as well as echinoderm, mollusk, foraminifera, and diatom fossils (UCMP, 2015).

Markley Formation. The late Eocene Markley Formation is exposed in Contra Costa and San Mateo Counties and is composed of interbedded, shallow marine to terrestrial, argillaceous shale, mudstone, and sandstone (NGMDB, 2015). The Markley Formation has yielded an abundant microfossil assemblage and invertebrate fauna, including specimens of gastropod, bivalve, foraminifera, radiolarian, and diatom (Squires, 1988, 107). In addition, at least five vertebrate localities have been recorded within the Markley Formation, which yielded fossil specimens of bony fish (UCMP, 2015).

Temblor Formation. The Oligocene to Early Miocene Temblor Formation is exposed throughout the southeastern CCFO Planning Area and was named for exposures northwest of McKittrick in northwestern Kern County (NGMDB, 2015). The Temblor Formation is up to 500 feet and is composed of interbedded terrestrial and marine sandstone and shale deposits, including light gray to tan arkose, gray to red pebbly sandstone, and gray red claystone (Bridges and Castle, 2003, 275:285; Graham et al., 1989, 713:716). The Temblor Formation has yielded abundant fossils resources from more than 700 localities in central California. Of those localities, 38 yielded hundreds of vertebrate specimens including sea cows, gomphothere, mastodon, extinct horse, pinnipeds, fish, and sharks, among other taxa (UCMP, 2015).

Vaqueros Formation. The early Miocene age Vaqueros Formation is intermittently exposed throughout the CCFO Planning Area. The Vaqueros Formation is a brown-gray, massive to thickly bedded marine sandstone, with interbedded siltstone, shale, and subordinate nonmarine conglomerate (NGMDB, 2015). The deposit has yielded numerous vertebrate fossils in Monterey and San Benito Counties including specimens of whale, hippopotamus, and shark (UCMP, 2015).

Lompico Formation. The Middle Miocene Lompico Formation is exposed within the CCFO Planning Area in Santa Cruz County where it conformably underlies the Monterey Group. The Lompico Formation is up to 500 feet thick and is composed of yellowish-gray, massive to thickly bedded, medium- to fine-grained, moderately to well-sorted calcareous arkosic sandstone and a thin granitic basal conglomerate (Clark, 1981, 18). According to the UCMP (2015), the Lompico Formation has yielded numerous invertebrate localities of molluscan fauna from Santa Cruz County as well as one vertebrate locality, which yielded a specimen of whale.

Monterey Group. The Monterey Group (also referred to as the Monterey Formation) is intermittently exposed throughout the CCFO Planning Area. The Monterey Group is up to approximately 5,000 feet thick and is dominated by finely laminated fine-grained diatomaceous and siliceous mudrocks; limestone and dolomite; calcareous and phosphatic mudrocks; chert and porcelanite; and subordinate tuff, sandstone, and conglomerate (Bramlette, 1946, 1:3; MacKinnon, 1989, 13:16). Numerous vertebrate localities have been documented from within the Monterey Group in California, including specimens of large sea turtles, whales, dolphins, sea lions, shark bones and teeth, desmostylians, sea cows, fish, birds, rare terrestrial vertebrates, and many other fauna (Bramlette, 1946, 9:10; Harden, 1998, 395:397; Koch et al., 2004, 7:10; Murphey et al., 2007, 45:70). Typically, specimens from the Monterey Group have been recovered within diatomite and shale deposits at depth and at the surface; however, limestone and sandstone beds also have yielded abundant remains (UCMP, 2015). In many cases, fossil specimens recovered from within the Monterey Group, such as whale, Chondrichthyes (cartilaginous fish), and bony fish, are remarkably well preserved and have previously yielded fully articulated specimens (Koch et al., 2004, 1). In addition, the Monterey Group has yielded numerous species of scientifically significant invertebrates, foraminifera, and plants, such as kelps and other large soft-bodied seaweeds.

The Briones Formation, Cierbo Formation, and Neroly Sandstone of the San Pablo Group. The Miocene San Pablo Group is exposed in the CCFO Planning Area and extends throughout Contra Costa, Alameda, Stanislaus, and Santa Clara Counties (Graymer et al., 1996). The Briones Formation is the oldest member of the San Pablo Group, which includes the overlying Cierbo and Neroly formations (Carpenter et al., 1984, 35; NGMDB, 2015). The shallow marine Briones Formation is up to 2,300 feet thick near its type section and consists of indistinctly bedded fine-grained quartz sandstone, lithic wacke, gray to brown conglomerate, interbedded silty claystone, and resistant shell conglomerate (Chetelat, 1995, 8; Graymer et al., 1996; NGMDB, 2015). The Briones Formation has yielded an abundant and diverse fauna, including an extinct hippopotamus-like herbivorous mammal and taxa of reptile, fish, bird, shark, bivalve, gastropod, crustacean, echinoid, and brittle stars (UCMP, 2015).

The Miocene Cierbo Formation is up to 650 feet thick and consists of poorly to moderately consolidated white to pale yellow brown quartz sandstone interbedded with thin pebble conglomerate lenses and brown shale deposits (Carpenter et al., 1984, 35). The Cierbo Formation has yielded unnamed vertebrate fossils as well as abundant fossil specimens of invertebrate fauna, including mollusk, sea urchin, stony coral (Graymer et al., 1996; UCMP, 2015).

The Neroly Formation is up to 1,800 feet thick and is characterized by distinctive blue-gray sandstone derived from andesitic eruptions to the east (Bartow, 1984, A5; Throckmorton, 1988, 33). Numerous marine and terrestrial invertebrate, vertebrate, and plant fossils of have been recovered from within the Neroly Formation including well-preserved taxa of wolf, skunk, proboscidean, pronghorn, primitive beaver, and primitive New World mouse (Graymer et al., 1996; Throckmorton, 1988, 34). Additional fossil remains recovered within the Neroly Formation include horse, ground squirrel, eagle ray, gastropod, bivalve, scaphopod, coral, crab, sea urchin, and plants (UCMP, 2015).

Oro Loma Formation. The Miocene to Pliocene Oro Loma Formation is exposed within Alameda, Stanislaus, Merced, and San Joaquin Counties in the CCFO Planning Area and unconformably overlies the Briones Group (Graymer et al., 1996; NGMDB, 2015). The Oro Loma Formation is up to 300 feet thick and consists of unconsolidated to moderately consolidated red siltstone, sandstone, and pebble conglomerate interbedded with greenish-gray claystone. The Oro Loma Formation has yielded several fossil localities within the eastern Diablo Range, which yielded specimens of horse and camel (Kelly and Stewart, 2008, 2; Paleobiology Database, 2015; UCMP, 2015).

Santa Margarita Formation. The Late Miocene age Santa Margarita Formation is intermittently exposed throughout the CCFO Planning Area in Fresno, Monterey, Santa Cruz, San Benito, and Santa Clara Counties (Jennings, 1958; NGMDB, 2015; UCMP, 2015). The Santa Margarita Formation conformably overlies the Monterey Formation in the Diablo Range and consists of deep to shallow marine deposits com-

posed of buff, poorly indurated sandstone and biogenic shale and terrestrial sandy conglomerate. The Santa Margarita Formation has produced abundant fossil specimens of mastodon, artiodactyl, horse, rabbit, walrus, sea cow, pinniped, shark, fish, reptile, bird, bivalve, gastropod, bryzoa, and echinoderm (UCMP, 2015).

Santa Cruz Mudstone. The Late Miocene Santa Cruz Mudstone is exposed within the CCFO Planning Area in Santa Cruz County where it conformably overlies the Santa Margarita Formation. The Santa Cruz Mudstone is composed of yellowish-brown, thickly bedded to laminated, blocky siliceous mudstone (Clark, 1981). The Santa Cruz Mudstone has yielded pollen, foraminifera, and mollusks from Santa Cruz County as well as a number of rare vertebrate localities, which yielded fossil specimens of fish scales and a sea cow rib (Clark, 1981). In addition, the UCMP online database (2015) identifies two localities that record occurrences of bony fish and shark.

Jacalitos Formation. The shallow marine to nonmarine Jacalitos Formation of Miocene to Pliocene age is exposed in the CCFO Planning Area within Fresno, Monterey, and San Benito Counties. The unit consists of fluvial and nearshore quartzitic and andesitic sandstone, siltstone, and conglomerate (NGMDB, 2015). Several invertebrate and vertebrate localities have been recovered from within the Jacalitos Formation, which yielded specimens of horse, echinoderm, mollusk, and brachiopod (UCMP, 2015).

Purisima Formation. The Early to Middle Pliocene age Purisima Formation is exposed within the CCFO Planning Area in San Mateo, Santa Clara, and Santa Cruz Counties and consists of basal marine deposits composed of poorly consolidated, laterally variable, claystone, siltstone, and fine-grained sandstone that coarsen up into terrestrial sandstone and conglomerate (NGMDB, 2015). Numerous vertebrate and invertebrate localities have been documented within the Purisima Formation, including hundreds of specimens of birds, shark, bony fish, reptile, pinniped, dolphin, whale, sea cow, horse, rodent, crustacean, echinoderms, bivalve, gastropod, and foraminifera (UCMP, 2015).

Tehama Formation. The Pliocene age Tehama Formation is exposed in Contra Costa County and is composed of fluvially deposited, green-gray to tan quartzitic and tuffaceous sandstone, with lenticular siltstone deposits and crossbedded cobble conglomerate (Blake et al., 2000, 2; UCMP, 2015). Numerous vertebrate localities have been documented within the Tehama Formation outside of the CCFO Planning Area in adjacent counties, including specimens of mastodon, mammoth, horse, artiodactyl, dog, shrew, sloth, rodent, fish, and reptile (UCMP, 2015).

Etchegoin Formation. The Pliocene Etchegoin Formation is exposed in the CCFO Planning Area along the western margin of the San Joaquin Valley and into the eastern foothills of the Coast Ranges from Monterey County to San Benito County (NGMDB, 2015). Near the type section, the Etchegoin Formation overlies the Santa Margarita and Monterey Formations and is in turn overlain by the Tulare Formation. The Etchegoin Formation is composed of weakly lithified, light gray, well-bedded sandstone with interbeds of gray silty shale (Dibblee, 2005d). The unit has also yielded vertebrate specimens of whale, shark, dolphin, beaver, otter, mammoth, deer, mastodon, rhinoceros, fox, and horse, as well as an abundant molluscan fauna (NGMDB, 2015; UCMP, 2015).

San Benito Gravels. The Pliocene to Pleistocene age San Benito Gravels are exposed in San Benito County and consist of moderately consolidated conglomerate, sandstone, and argillaceous shale (NGMDB, 2015). At least eight vertebrate localities have been identified in the San Benito Gravels, which have yielded several fossil specimens of horse and mammoth (UCMP, 2015).

Irvington Gravels. The Pliocene to Pleistocene age Irvington Gravels are exposed in Alameda County within the CCFO Planning Area and consist of poorly to well-consolidated, distinctly bedded pebbles and cobbles, gray pebbly sand, and gray, coarse-grained, cross-bedded sand (Helley and Graymer, 1997). The UCMP online database (2015) lists four vertebrate localities for the Irvington Gravels, which yielded hundreds of fossil specimens, including taxa of horse, camel, ground sloth, mammoth, dire wolf, fox, coyote, saber-toothed cat, rabbit, rodent, as well as the type specimen for *Tetrameryx irvingtonensis* (pronghorn).

Livermore Gravels. The Pliocene to Pleistocene age Livermore Gravels are exposed within Alameda County and consist of loosely consolidated, massive to poorly bedded, gray to greenish-brown cobble conglomerate with a coarse arkosic matrix; conglomeritic sandstone; coarse-grained sandstone; and subordinate, interbedded greenish-blue siltstone and claystone (Helley and Graymer, 1997, 8). At least five vertebrate fossil localities within the Livermore Gravels have been recorded by the UCMP (2015) from various localities in central Alameda County, including specimens of bison, mammoth, horse, rodent, and turtle, and bird.

Paso Robles Formation. The Late Pliocene to Early Pleistocene nonmarine Paso Robles Formation extends from the Salinas Valley through the southern border of the CCFO Planning Area and is composed of grayish-red sandstone, claystone, limestone, and conglomerate with clasts of white siliceous shale and chert derived from the underlying Monterey Formation (NGMDB, 2015; Tennyson, 1992). The fluvial-lacustrine unit is more than 3,000 feet thick and is composed primarily of gravel and sand channel and floodplain deposits, and with subordinate silt, clay, and limestone representing short-lived lakes. The Paso Robles Formation has numerous localities in the CCFO Planning Area, including several localities identified in the Salinas Valley and in Monterey County that yielded fossil specimens of horse tooth, rodent bones, seal, gastropod, and ostracode (Addicott and Galehouse, 1973, 510; UCMP, 2015; Woodring and Bramlette, 1950, 96).

Tulare Formation. The Late Pliocene to Early Pleistocene Tulare Formation is exposed in Fresno, Stanislaus, San Joaquin, and Alameda Counties within the CCFO Planning Area. The unit is approximately 1,700 to 3,500 feet thick and is composed of moderately lithified, thickly bedded, white to tan marl, massive gray claystone, and local gypsum and other fresh water evaporates (Bartow, 1990, 6; Dibblee and Minch, 2007b, 2007d). Numerous vertebrate localities have been recovered from within the fine-grained sediments of the Tulare Formation within the CCFO Planning Area within Alameda and San Joaquin Counties, which yielded specimens of horse, bird, shark, fish, and rodent. In addition, the remains of several well-preserved plants, including taxa of giant sequoia, pine, manzanita, fir, and walnut, were recovered in Stanislaus County (UCMP, 2015).

Merced Formation. The Pliocene to Pleistocene age Merced Formation is exposed within the CCFO Planning Area in Santa Clara, San Mateo, and San Francisco Counties. The Merced Formation is composed of up to 5,000 feet of marine to nonmarine grayish-brown medium- to fine-grained sandstone and silty clay, with subordinate interbedded pebble conglomerate and local tuffaceous deposits (NGMDB, 2015). According to the UCMP (2015), the Merced Formation has yielded abundant microfossils, plants, mollusk, and echinoderm specimens as well as at least 24 vertebrate localities, which yielded fossil specimens of bird, shark, fish, mammoth, horse, ground sloth, deer, camel, whale, dolphin, seal, and mastodon.

Quaternary Older Alluvium. Quaternary age alluvial deposits are exposed throughout the CCFO Planning Area and are composed of variable lithology derived from diverse sources (Graymer, 1996; Jennings, 1958; Jennings and Strand, 1958; Koenig, 1963; Strand and Koenig, 1965; UCMP, 2015). The deposits typically consist of unconsolidated to moderately consolidated, moderately dissected, locally variable compositions of silt, sand, gravel, and larger clasts deposited as alluvial fan and channel deposits, fluvio-lacustrine deposits, terrace deposits, and landslides. Quaternary alluvial, fluvial, and lacustrine deposits of Pleistocene age have proven to yield significant vertebrate fossil localities throughout the California Coast Ranges and the Central Valley. Recovered specimens include terrestrial mammals such as mammoth, horse, camel, bison, cat, bird, rodent, and reptile (UCMP, 2015). Some Pleistocene-age alluvial deposits are composed of coarse-grained material, which is not typically conducive to the preservation of fossils (e.g., alluvial fan deposits). For example, coarse-grained surficial Quaternary deposits derived from the local plutonic igneous rocks are unlikely to contain fossils; however, older, finer-grained alluvial sediments may contain significant paleontological resources.

Leases Subject to Settlement Agreement

Table 3.16-3 lists the geologic units underlying each of the 14 Leases Subject to Settlement Agreement.

Table 3.16-3. Major Fossil-Bearing Units within the Leases Subject to Settlement Agreement

Leases Subject to Settlement Agreement		Geologic Unit(s)
1	CACA 052959	Monterey Group
2	CACA 052960	Monterey Group, Paso Robles Formation
3	CACA 053824	Monterey Group
4	CACA 053825	Monterey Group
5	CACA 053826	Monterey Group
6	CACA 053827	Monterey Group, Paso Robles Formation
7	CACA 053828	Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, and Oro Loma Formation
8	CACA 053829	Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, and Monterey Group
9	CACA 053830	Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, and Oro Loma Formation
10	CACA 053831	Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, and Oro Loma Formation
11	CACA 053832	Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, and Monterey Group
12	CACA 053833	Laguna Seca Formation, Martinez Formation, and Lodo Formation
13	CACA 053834	Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, and Kreyenhagen Formation
14	CACA 053835	Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, and Quaternary Older Alluvium

Sources: Dibblee and Minch, 2006, 2007a, 2007c; Graymer, 1996; Jennings, 1958; Jennings and Strand, 1958; Koenig, 1963; Strand, 1964

New Paleontological Resources Identified in the Central Coast Field Office Planning Area Since 2007

The 2007 Hollister Field Office Proposed RMP/Final EIS described the existing paleontological resources in the CCFO Planning Area and summarized important discoveries since 1937, when a nearly complete skeleton of a plesiosaur was recovered from within the Moreno Formation (BLM, 2007a, 3.14-2; Staebler, 1981). Subsequent to that discovery, hundreds of localities within the CCFO Planning Area have produced a diverse flora and fauna that spans the Upper Cretaceous through the Pleistocene Epochs. Most notably, the Upper Cretaceous Moreno Formation, Eocene Kreyenhagen Formation (including the Tumey Sandstone member), and Early Miocene Temblor Formation have been especially fossiliferous and have yielded thousands of vertebrate, invertebrate, microfossil, and plant specimens.

Since 2007, several additional significant fossil resources have been recovered from the CCFO Planning Area. During the 2008–2010 field seasons, BLM Natural Resource Specialist Ryan O'Dell along with Conservation and Land Management interns conducted intensive field surveys of the Moreno Shale in order to document and map fossils within this unit. In 2008, O'Dell documented a locality yielding large log and leaf impressions of the conifer *Margeriella cretacea* (BLM, 2010, 3). In the same field season,

O'Dell collected an indeterminate genus of sea turtle from the Moreno Shale in the Tumey Hills (BLM, 2010, 4). Also in 2008, field surveys conducted by BLM Heritage Resources Program Manager Erik Zaborsky and paleontologist Chad Staebler in the Panoche Hills yielded a mosasaur within the Moreno Shale that was subsequently excavated in 2010 with the help of a local Boy Scouts troop. Another field survey led by O'Dell within the Panoche Hills uncovered a plesiosaur identified as *Elasmosaurus* sp. in 2009 (BLM, 2010, 5). Excavation of the plesiosaur by Chad Staebler, interns, and students from the Riekes Center later in the same field season produced 34 vertebrae, several ribs and gastralia, both scapulae, both coracoids, one humerus, one ulna, and several phalanges of a single individual (BLM, 2010, 6).

Also in 2009, a team of students from the Webb School, led by Don Lofgren from the Raymond Alf Museum, returned to the Path 15 sites within the Temblor Formation to conduct the first excavation since it was originally discovered in 2004 (BLM, 2010). They also collected sediments to wash for the presence of microfossils (BLM, 2010). Their efforts produced macroscopic mammal bone fragments and thousands of gastropods through screen washing and picking including *Menetus micromphalus, Planorbula mojavensis, Hawaiia minuscula*, and *Lymnaea mohaveana* (Lofgren, Personal communication, 2011).

In addition, in March 2015, several fossil specimens were identified from an early Holocene age oil seep discovered in the vicinity of Oil Canyon just north of Coalinga, California (R. O'Dell, personal communication, 18 August 2015). Recovered specimens include Aves (bird), Squamata (scaled reptile), *Quercus* (oak), *Eriogonum* (wild buckwheat), *Typha* (cattail), and Poaceae (grass), as well as abundant insects (Odonata, Lepidoptera, Coleoptera, Orthopter),

The CCFO Planning Area has produced an abundance of significant flora and fauna representing extinct ecosystems unique to north-central coastal California. Since the first fossils were uncovered within the CCFO Planning Area, rare and unique taxa, including near complete specimens of conifer, flowering plants, mosasaurs, plesiosaurs, and type specimens of mammals have been found that provide a more complete understating of the ecosystem over time. Additionally, given the abundance of fossil material recovered from within the CCFO Planning Area, it is highly likely that this area will continue to produce significant resources in the future.

3.17 Social and Economic Conditions

3.17.1 Introduction

This chapter describes the laws and regulations that govern social and economic issues at a Federal level, including environmental justice. It should be noted that U.S. Bureau of Land Management (BLM) oil and gas management actions (e.g., lease stipulations or areas closed to leasing) affect the social and economic environment outside of lands solely under jurisdiction of the BLM. This is because the social and economic effects of an action like oil and gas development on lands under jurisdiction of the BLM can extend to populations and communities located outside BLM surface lands. Additionally, where Federal mineral estate occurs under private lands, social and economic factors related to oil and gas developments within the Central Coast Field Office (CCFO) Planning Area extend to populations and communities located outside BLM surface lands. Therefore, this section summarizes the existing environment regarding socioeconomics of the oil and gas industry and environmental justice (including data on existing minority and low-income communities) for each county contained within the CCFO Planning Area boundary.

3.17.2 Regulatory Framework

BLM Land Use Planning Handbook, Appendix D

Appendix D (Social Science Considerations in Land Use Planning Decisions) of the BLM Land Use Planning Handbook provides guidance on integrating social science information into the planning process for projects and actions within BLM lands (BLM, 2005). Any information gathered for planning purposes must be considered in the context of BLM's legal mandates. Appendix D provides guidance for effectively integrating social scientific data and methods into the entire planning process. Furthermore, Section IV (Environmental Justice Requirements) of Appendix D provides guidance for assessing potential impacts on population, housing, and employment as they relate to environmental justice. It also describes how variables such as lifestyles, beliefs and attitudes, and social organizations should be considered by the BLM with respect to evaluating potential impacts from a project or action on social and economic conditions, including environmental justice.

Executive Order 12898

In 1994 President Clinton issued the Executive Order (EO), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, to focus Federal attention on environmental and human health conditions in minority and low-income communities. EO 12898 promotes nondiscrimination in Federal programs that substantially affect human health and the environment, and it provides information access and public participation relating to these matters. This order requires Federal agencies (and State agencies receiving Federal funds) to identify and address any disproportionately high or adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations. The Council on Environmental Quality (CEQ) oversees Federal compliance with EO 12898.

Executive Order 12866

Under Executive Order 12866, agencies are required, to the extent permitted by law, "to assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." The purpose of estimating the "social cost of carbon" (SCC) is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions (United States, 2015). Chapters 3.6 and 4.6 of this EIS discuss climate change and greenhouse gas emissions as they relate to the

proposed RMPA. While oil and gas activities under the proposed RMPA 2015 Reasonably Foreseeable Development Scenario would result in CO2 emissions, a cost-benefit analysis was not found warranted for the proposed RMPA under guidance provided in BLM Land Use Planning Handbook, Appendix D.

Council on Environmental Quality's Environmental Justice Guidance Under the National Environmental Policy Act

To ensure that environmental justice concerns are effectively identified and addressed according to EO 12898, the U.S. Council on Environmental Quality (CEQ), in consultation with the Environmental Protection Agency (EPA), has developed guidance to assist all Federal agencies with implementing procedures. According to the CEQ's "Environmental Justice Guidance Under NEPA," agencies should consider the composition of affected areas to determine whether minority or low-income populations are affected by a proposed action, and, if so, whether those environmental effects may be disproportionately high or adverse (CEQ, 1997).

3.17.3 Regional Setting

This section summarizes existing social and economic conditions within the CCFO Planning Area. The CCFO Planning Area boundary contains twelve California counties:

- Alameda
- Contra Costa
- Fresno
- Merced
- Monterey
- San Benito
- San Francisco
- San Joaquin
- San Mateo
- Santa Clara
- Santa Cruz
- Stanislaus

This section includes programmatic summaries of socioeconomic conditions for areas both inside and outside BLM surface lands within the CCFO Planning Area boundary. Areas outside BLM surface lands are included because social and economic factors related to oil and gas developments on BLM-administered lands within the CCFO Planning Area extend to population and communities located outside BLM surface lands. Therefore, the NEPA "affected environment" includes the overall socioeconomic conditions of communities affected by activities on BLM surface lands or by BLM management decisions. This section uses best-available recent data to establish the existing socioeconomic resource conditions in environmental justice populations at a programmatic level.

In presenting existing conditions of socioeconomic resources and environmental justice populations, unique considerations create differing "study area" boundaries. For example, a regional study area may include an entire county or larger metropolitan area. Meanwhile, a local study area may include communities proximate to an existing oil and gas field where employees and support businesses likely reside. Where applicable, in describing the social and economic conditions, study areas are defined and representative qualitative and quantitative data are presented.

Social Demographic Setting

Table 3.17-1 summarizes current and forecasted population trends, current minority and low-income population percentages, current housing data, and average household size and income statistics for all twelve counties within the CCFO Planning Area boundary. As shown, significant population growth is forecasted for all twelve counties. Alameda County and Santa Clara County provide the greatest number of housing units within the CCFO Planning Area. Merced County has both the highest housing vacancy rate and also the lowest median home price. Housing data is important when considering socioeconomics as changes in social structure of a community directly influence the housing market. Furthermore, proposed developments (particularly those expected to generate a specified number of low-wage jobs) can impact the community's current housing market and demand for more affordable housing. As expected, Bay Area counties have the highest median home values and household incomes.

Table 3.17-1. Demographic and Housing Statistics, by County

Category	Alameda	Contra Costa	Fresno	Merced	Monterey	San Benito	San Francisco	San Joaquin	San Mateo	Santa Clara	Santa Cruz	Stanislaus
Population (2014)	1,573,254	1,087,008	964,040	264,922	425,756	57,517	836,620	710,731	745,193	1,868,558	271,595	526,042
Minority population percentage	65.9%	52.2%	67.3%	68.2%	67.0%	62.0%	58.2%	64.1%	57.5%	64.8%	40.2%	53.3%
Low-income population percentage	12.0%	10.2%	24.8%	24.6%	16.1%	12.7%	13.2%	17.5%	7.4%	9.7%	14.4%	19.2%
2020 Projection	1,682,348	1,166,670	1,055,106	288,991	446,258	63,418	891,493	766,644	777,088	1,970,828	281,870	573,794
2030 Projection	1,835,340	1,281,561	1,200,666	337,798	476,874	73,459	967,405	893,354	822,889	2,151,165	295,538	648,076
2040 Projection	1,978,656	1,400,999	1,332,913	389,934	500,194	82,969	1,027,004	1,037,761	874,626	2,331,887	303,512	714,910
2050 Projection	2,115,824	1,512,940	1,464,413	439,075	520,362	90,802	1,081,540	1,171,439	925,295	2,482,347	307,606	783,005
2060 Projection	2,195,999	1,620,604	1,587,852	485,712	533,575	99,215	1,103,174	1,306,271	936,151	2,585,318	314,875	856,717
Housing Units (2014)	588,948	405,828	322,489	84,298	138,817	18,130	381,143	236,943	273,532	644,691	105,047	180,165
Vacant units	37,798 (6.4%)	25,266 (6.2%)	26,633 (8.3%)	8,108 (9.6%)	13,128 (9.5%)	1,079 (6.0%)	31,405 (8.2%)	18,987 (8.0%)	13,300 (4.9%)	28,233 (4.4%)	10,174 (9.7%)	14,375 (8.0%)
Average person per household	2.78	2.83	3.2	3.39	3.23	3.35	2.32	3.2	2.83	2.98	2.73	3.14
Median home price (2013)	$485,000	$392,500	$152,500	$148,000	$356,250	$355,000	$830,000	$215,000	$742,000	$645,000	$505,000	$175,000

Source: U.S. Census, 2015; DOF, 2014a; DOF, 2014b

Environmental Justice Demographics

Defining Environmental Justice Populations

According to the CEQ environmental justice guidelines, an environmental justice population would be identified if:

- A minority or low-income population percentage either exceeds 50% of the population of the affected area, or
- If the minority or low-income population percentage of the affected area is meaningfully greater than the minority or low-income population percentage in the general population or other appropriate unit of geographic analysis (e.g., a governing body's jurisdiction, the county or city in which the affected area is located within, neighborhood census tract, or other applicable unit).

The CEQ Environmental Justice Guidance defines "minorities" as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black not of Hispanic origin, or Hispanic (CEQ, 1997). The total minority population has been calculated by subtracting the white alone, not Hispanic or Latino, population from the total population. For this analysis, an environmental justice minority population is identified when the minority population of the potentially affected area is greater than 50%.

The CEQ Environmental Justice Guidance defines "low-income populations" as populations with mean annual incomes below the annual statistical poverty level. For this analysis, low-income population was determined by utilizing the U.S. Census data for persons "below poverty level." The CEQ and EPA guidance do not provide a discrete threshold for determining when a low-income population should be identified for environmental justice. For this analysis, an environmental justice low-income population is identified when the percentage of low-income population of the potentially affected area is equal to or greater than the low-income population of the greater geography. Because this programmatic analysis includes twelve California counties, the baseline (greater geography) low-income percentage for county comparison is that of California. To ensure a more regional robust comparison is also completed for environmental justice, each county within the CCFO Planning Area is compared against one another. For local communities (Section 3.17.4.2), the baseline (greater geography) low-income percentage for comparison is that of the county in which they are located within.

Regional Study Area Minority and Low-Income Populations

With respect to environmental justice and minority populations, Table 3.17-1 shows that only Santa Cruz County is not considered to have a disproportionate minority population (40.2%) within the CCFO Planning Area boundary. All remaining counties within the CCFO Planning Area contain a minority population exceeding 50%, with Merced County containing the highest (68.2%).

With respect to environmental justice and low-income populations, California contains an overall low-income percentage of 15.9% (U.S. Census, 2015). Considering this, Fresno, Merced, Monterey, San Joaquin, and Stanislaus Counties have a low-income population greater than California and are considered low-income areas of concern with respect to environmental justice. Furthermore, comparing each county against each other in Table 3.17-1 shows that Fresno and Merced Counties contain disproportionately high percentages of low-income population within the CCFO Planning Area.

3.17.4 Current Economic Conditions and Trends

The following provides a description of the current demographic and economic conditions at a localized level, while still being programmatic in nature. In addition to core demographic and economic indicators, this section also presents data on the oil and gas industry within the CCFO Planning Area, communities within areas designated with high oil and gas occurrence potential (refer to Figure 5-1), and areas identi-

fied as sensitive during the Social and Economic Workshop held on February 4, 2015 (BLM, 2015). Please refer to Appendix F for the complete Workshop Summary Report.

3.17.4.1 RMPA Social and Economic Workshop

In order to develop the social and economic analysis for the EIS and RMPA, the BLM has undertaken a public involvement effort that includes a social and economic workshop. The Social and Economic Workshop (Workshop) was held on February 4, 2015. The purpose of the Workshop was to provide an opportunity for local government officials, community leaders, and other citizens to discuss regional economic conditions, trends, and strategies with BLM managers and staff.

The Workshop was held in Monterey County and 11 participants attended, which included local agency representatives, oil and gas industry representatives, and members of the general public. The workshop provided information on local and regional economic and social conditions and trends; assisted participants with identifying desired economic and social conditions; and identified ways to advance local economic and social goals through BLM's planning and policy decisions associated with the proposed RMPA. The major themes and issues identified during the workshop included:

- BLM-administered mineral estate designated as open on split estate leases can impact private land owners and hinder the local government economic goals and planning efforts should oil and gas surface activities be incompatible with surrounding land uses and long-term land use planning strategies;
- BLM planning and policy should consider consistency with local agencies' applicable plans and policies regarding oil and gas development; and
- The EIS should consider programmatic direct and indirect economic effects of continued oil and gas development within areas of the CCFO Decision Area where oil and gas occurrence potential is considered high.

3.17.4.2 Central Coast Field Office Planning Area

Table 3.17-2 summarizes current economic indicators for all twelve counties within the CCFO Planning Area boundary, including the most currently available data for the mineral extraction industry (which includes fossil fuels). As shown, Fresno County has the highest unemployment rate, with San Mateo County containing the lowest. Meanwhile, San Joaquin County is expected to see the greatest job growth through year 2019, with Monterey County expected to the see the least. Significant personal income growth is expected for all counties through year 2019.

As shown in Table 3.17-2, active oil and gas wells on BLM-administered mineral estate account for only 110 (0.6%) of the total 18,229 active wells within the CCFO Planning Area. With respect to the mineral extraction industry, Table 3.17-2 shows that Fresno, Monterey, and San Joaquin Counties contain the most active oil and gas wells within the CCFO Planning Area. Those counties, along with Contra Costa, Merced, and Santa Cruz Counties, have seen significant labor earning growth within the mineral extraction industry between years 2001 and 2012. While contributing significant labor earnings, the mineral extraction employment accounts for only a small percentage of the overall employment within each county (refer to Table 3.17-1).

Localized Communities of Interest

As described above, existing oil and gas leases within the CCFO Planning Area are primarily located within Fresno County, Monterey County, and San Benito County. Future oil and gas development is also likely to occur in these regions. These three counties comprise the local study area. Currently, each county receives substantial tax revenue from oil and gas fields as well as from employees' income taxes. Economic characteristics unique to each county include the following:

Table 3.17-2. Economic Indicators by County

Category	Alameda	Contra Costa	Fresno	Merced	Monterey	San Benito	San Francisco	San Joaquin	San Mateo	Santa Clara	Santa Cruz	Stanislaus
Median household income	$69,151	$74,815	$43,756	$42,741	$54,341	$63,613	$72,020	$50,168	$87,601	$88,478	$63,092	$44,053
Per capita income	$57,595 ranked 9th in CA	$65,106 ranked 5th in CA	$34,864 ranked 44th in CA	$31,293 ranked 56th in CA	$46,224 ranked 24th in CA	$39,422 ranked 37th in CA	$86,588 ranked 2nd in CA	$34,483 ranked 47th in CA	$79,021 ranked 3rd in CA	$70,772 ranked 4th in CA	$54,615 ranked 10th in CA	$35,434 ranked 45th in CA
Average salary per worker	$79,614	$77,456	$48,198	$45,813	$54,301	$49,593	$107,171	$51,179	$94,085	$113,951	$52,908	$50,993
Unemployment rate	5.7%	6.1%	12.1%	14.3%	9.3%	10.8%	4.4%	11.7%	4.2%	5.3%	9.0%	12.3%
Expected job growth (2014-2019)	7.9%	8.4%	10.7%	7.7%	6.3%	7.4%	8.4%	10.4%	9.4%	10.0%	6.8%	9.0%
Expected personal income growth (2014-2019)	15.7%	16.0%	16.3%	16.0%	13.5%	15.3%	19.2%	16.8%	19.1%	23.3%	17.2%	16.3%
MINERAL EXTRACTION INDUSTRY												
Active mines	8	4	13	18	13	11	3	11	3	4	4	7
Active oil and gas wells	93	663	11,550	195	3,596	388	0	1,225	196	112	65	146
Active oil and gas wells on Federal mineral estate[1]	0	2	35	0	14	56	0	0	0	0	3	0
Number of jobs	135	1,073	208	144	203	106	54	88	31	212	312	32
Average annual wage per worker	$94,191	$220,106	$83,449	N/A	$92,476	N/A	$126,335	$68,144	$82,040	$72,501	N/A	$51,826
Labor earning trends ($000)												
2001	68,122	539,630	22,062	1,691	28,062	12,733	30,530	17,092	13,342	57,980	4,763	3,668
2012	44,950	694,153	38,319	9,789	39,418	7,216	58,051	13,757	16,657	49,651	22,984	3,181

1 - Active well data provided by the California Department of Conservation, Division of Oil Gas and Geothermal Resources that intersected Federal mineral estate within the CCFO Planning Area.
N/A = Data Unavailable
Source: DOT, 2014; Headwaters, 2014; U.S. BEA, 2014

- **Fresno County.** An abundance and wide variety of mineral resources are present in this county. Extracted resources include aggregate products (sand and gravel), fossil fuels (oil and coal), metals (chromite, copper, gold, mercury, and tungsten), and other materials used in construction or industrial applications (asbestos, high-grade clay, diatomite, granite, gypsum, and limestone). Aggregate and petroleum are the county's most significant extractive resources and play an important role in maintaining the county's overall economy (Fresno County, 2000).
- **Monterey County.** Large rural areas that are predominately used for agricultural purposes characterize this county. The majority of oil and gas-related activities occur within the southern portion of the county, which is generally characterized by an income level that is less than the county average due to the high number of agricultural workers. During the Social and Economic Workshop, representatives from Monterey County expressed that the southern portion of the county is of greatest concern regarding oil and gas development, with potential future areas for oil and gas leasing located along the travel routes to tourist destinations (e.g., lakes and missions) in southern Monterey County. The County also expressed that planning for this portion of the county is intended to enhance recreation and tourism in efforts to encourage residents and businesses to develop outside the existing agriculture and energy sectors that have shaped the southern portion of the County (BLM, 2015). Substantial oil reserves are believed to underlay parts of the Salinas Valley; the San Ardo oil field is the largest oil field in Monterey County. In 2006, the San Ardo oil field ranked 41st in the nation in terms of oil production (Monterey County, 2008).

  In addition, representatives from Monterey County Resource Management Agency have indicated that there may be a potential loss of tax revenue should split estate leases be limited or decreased within the County (BLM, 2015). Currently the county receives substantial tax revenue from oil and gas fields as well as from employees' income taxes. However, as shown in Table 3.17-2, the 14 active oil and gas wells on Federal mineral estate lands within Monterey County only account for 0.4% of the 3,596 active wells within the county.
- **San Benito County.** This County is largely rural, with over 90 percent of its land used for farming, ranching, forestry, or other public uses (San Benito, 2010a). San Benito County is not considered a major oil-producing region in California compared to other counties. Reserves within the county are estimated to be 101 million oil barrels (Mbbl) of oil and 63 million cubic feet (MMcf) of natural gas, while the top ten largest oil fields in the State contain up to 598,393 Mbbl of oil reserves and 329,109 MMcf of gas reserves (San Benito, 2010b).

Local Study Area Socioeconomics

Table 3.17-3 provides a summary of socioeconomic data for the incorporated communities within areas designated with high oil and gas occurrence potential within the CCFO Planning Area (refer to Figure 5-1). These local study area communities (Coalinga, Greenfield, King City, Bradley CDP, San Ardo CDP, and San Lucas CDP) were identified as sensitive areas related to oil and gas extraction during the Social and Economic Workshop held on February 4, 2015 (BLM, 2015). As shown in Table 3.17-3, the cities of Coalinga (Fresno County) and King City (Monterey County) are the largest communities within highly active areas of oil and gas production within the CCFO Planning Area. Both the cities of Coalinga and Greenfield contain the majority of oil and gas workers and those in the utilities industries.

Table 3.17-3. Socioeconomic Statistics for CCFO Planning Area Local Study Area Communities Within Areas Designated with High Oil and Gas Occurrence Potential

	Fresno County	Monterey County				
Category	Coalinga	Greenfield	King City	Bradley CDP[1]	San Ardo CDP[1]	San Lucas CDP[1]
Population	16,609	4,395	12,996	110	704	216
Minority population percentage	64.1%	66.8%	91.2%	28.2%	86.4%	97.7%
Low-income population percentage	22.8%	6.2%	20.5%	12.7%	20.3%	40.3%
Housing units (2014)	5,017	1,426	2,996	47	221	56
Vacant units	269 (5.4%)	107 (7.5%)	204 (6.8%)	6 (5.4%)	13 (5.4%)	6 (5.4%)
Median Household Income	$46,500	$47,759	$45,905	$51,750	$40,781	$47,500
Civilian Employed Workforce	6,141	1,853	4,500	37	183	61
Unemployment rate	8.6%	10.5%	21.1%	9.8%	51.6%	33.0%
Workforce in the mining, quarrying, and oil and gas extraction industries	154	102	0	0	9	3
Workforce in the construction industry	470	254	198	2	40	0
Workforce in the utilities industry	121	49	5	0	0	0

1 - A CDP (Census Designated Place) is a concentration of population identified by U.S. Census Bureau for statistical purposes. CDPs are populated areas that lack separate municipal government, but which otherwise physically resemble incorporated places.
Source: U.S. Census, 2015.

Local Study Area Economic and Fiscal Contribution of Oil and Gas Industry

BLM management decisions and policies affect many aspects of local and regional economy. Within the CCFO Planning Area, BLM administers approximately 284,000 acres of surface public land. BLM-administered lands within the CCFO Planning Area have the largest overarching influence on recreation and tourism aspects of local and regional economies. As shown in Table 3.17-2, active oil and gas wells on BLM-administered lands account for only 110 (0.6%) of the total 18,229 active wells within the CCFO Planning Area. However, all oil and gas leases issued by the BLM within the CCFO Planning Area generate revenue to the Federal Treasury. Because of the high oil and gas development and occurrence potential in the southern portion of the CCFO Planning Area, BLM management policy decisions on mineral estates does, at some level, influence the local economy and can contribute to, or affect, local governmental revenues.

Table 3.17-4 summarizes recent economic and fiscal contributions of the oil and gas industry within Monterey County, Fresno County, and San Benito County (regional study area). As shown, oil and gas production within these counties has beneficial economic and fiscal contributions. The average fiscal contribution per well is greatest in San Benito County and least in Fresno County. As shown earlier in Table 3.17-2, active wells within these county boundaries located on BLM-administered lands account for only a small portion of the total wells. Therefore, oil and gas wells on Federal mineral lands have a minor economic and fiscal contributions compared to the totals shown in Table 3.17-4.

Federal mineral estate that contains existing oil and gas leases, and likely to contain future oil and gas development, is primarily located within the southern region of the CCFO Planning Area. Resource development on public lands can produce employment and growth in the future. Assuming market conditions and regulatory conditions are attractive, and the BLM allows additional leasing and development of public lands, local job creation and continuation of the established oil and gas industry would continue at some level. Depending upon the level of development, County revenues can be sensitive to resource development pace and patterns and thus BLM decisions. Specifically, oil and gas leases on Federal mineral estate lands directly and indirectly produce county tax revenue, as shown in Table 3.17-4.

Severance taxes are often levied by state governments and are typically defined as taxes imposed distinctively on removal of natural products including oil and gas. However, there is no statewide severance tax on oil and gas production in California (DOC, 2015). There are ad valorem (property) taxes in California, administered by each county that would apply to split estate leases issued by the BLM. Furthermore, tax revenue is generated by direct spending on oil and gas infrastructure, worker wage spending and from secondary and indirect employment.

Local Study Area Minority and Low-Income Populations

With respect to environmental justice and minority populations, Table 3.17-3 shows that all communities with the exception of Bradley contain a minority population exceeding 50%. Of note, the communities of King City, San Ardo, and San Lucas contain exceptionally high concentrations of minority population.

With respect to environmental justice and low-income populations, Table 3.17-2 shows the community of Coalinga contains a low-income population slightly below that of Fresno County (refer to Table 3.17-2). However, this community is still considered to have a high percentage of low-income population for consideration of environmental justice. Within Monterey County, Table 3.17-3 shows the communities of King City, San Ardo, and San Lucas contain low-income populations greater than that of Monterey County (refer to Table 3.17-2) and are considered environmental justice communities. Of note, these communities have negligible numbers of people working in the oil and gas or utilities industries (refer to Table 3.17-2).

Table 3.17-4. Economic and Fiscal Contribution of Oil and Gas Industry – Monterey, Fresno, and San Benito Counties, 2012

MONTEREY COUNTY				
ECONOMIC CONTRIBUTION	**Employment**	**Labor Income ($ millions)**	**Value Added ($ millions)**	**Output ($ millions)**
Direct Employment[1]	1,087	$109.7	$191.4	$257.4
Indirect Employment	161	$8.1	$16.6	$24.4
Induced Employment	402	$17.8	$34.3	$49.0
Total Contribution	1,651	$135.6	$242.4	$330.8
Average Contribution per Active Well ($ dollars)[2]	—	***$37,709***	***$67,408***	***$991,991***

FISCAL CONTRIBUTION	**State and Local ($ millions)**	**Federal ($ millions)**	**Total Taxes ($ millions)**
Total Tax Revenue[3]	$136.6	$60.6	$197.2
Average Contribution per Active Well ($ dollars)[2]	***$37,987***	***$16,852***	***$54,839***

FRESNO COUNTY				
ECONOMIC CONTRIBUTION	**Employment**	**Labor Income ($ millions)**	**Value Added ($ millions)**	**Output ($ millions)**
Direct Employment[1]	1,924	$124.9	$252.4	$371.1
Indirect Employment	410	$19.2	$33.3	$51.6
Induced Employment	648	$26.4	$53.2	$77.6
Total Contribution	2,982	$170.5	$338.9	$500.3
Average Contribution per Active Well ($ dollars)[2]	—	***$14,762***	***$29,341***	***$43,316***

FISCAL CONTRIBUTION	**State and Local ($ millions)**	**Federal ($ millions)**	**Total Taxes ($ millions)**
Total Tax Revenue[3]	$290.1	$110.5	$400.6
Average Contribution per Active Well ($ dollars)[2]	***$25,117***	***$9,567***	***$34,684***

SAN BENITO COUNTY				
ECONOMIC CONTRIBUTION	**Employment**	**Labor Income ($ millions)**	**Value Added ($ millions)**	**Output ($ millions)**
Direct Employment[1]	197	N/A	N/A	N/A
Indirect Employment	N/A	N/A	N/A	N/A
Induced Employment	N/A	N/A	N/A	N/A
Total Contribution	268	$18.8	$34.4	N/A
Average Contribution per Active Well ($ dollars)[2]	—	***$48,454***	***$88,660***	***N/A***

FISCAL CONTRIBUTION	**State and Local ($ millions)**	**Federal ($ millions)**	**Total Taxes ($ millions)**
Total Tax Revenue[3]	N/A	N/A	$26.7
Average Contribution per Active Well ($ dollars)[2]	***N/A***	***N/A***	***$68,814***

Source: Los Angeles County Economic Development Corporation, 2014
N/A: Data Not Available
1 - Includes: Oil and gas extraction, support activities, natural gas distribution, oil and gas pipeline construction, petroleum refineries, petroleum and petroleum product wholesalers, gasoline stations, fuel dealers, pipeline transportation.
2 - Total divided by County well data provided in Table 3.17.2.
3 - Includes: Sales and excise taxes, property taxes, personal income taxes, corporate profits taxes, social insurance taxes, other taxes, and fees, fines, and permits,

Leases Subject to Settlement Agreement

As described in Chapter 1, the BLM-managed areas within the CCFO Planning Area contain 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749. These lease areas are located both in south Monterey County and central San Benito County (near the boundary with Fresno County). The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). A summary of the existing social and economic conditions for these communities is discussed earlier and shown in Table 3.17-3.

3.18 Transportation and Access

3.18.1 Introduction

This section addresses transportation and access on Bureau of Land Management (BLM) lands, including recreational motorized vehicle use. The lands managed by the Central Coast Field Office (CCFO) are highly dispersed. The regional transportation network, including highways, major roads, county roads, rail, and aviation is shown on Figure 3.18-1, although a detailed description of the regional network is not included here. The discussion of hazardous materials transport is in Sections 3.4 and 4.4 (Hazardous Materials and Public Safety).

This section focuses on BLM roads and trails that provide access to, and through, BLM public lands. Travel and transportation are integral parts of virtually every activity on public lands including recreation, livestock grazing, wildlife management, commodity resources management, rights-of-way (ROWs) for private inholdings, and public land management and monitoring. BLM's Comprehensive Travel and Transportation Management (CTTM) program encompasses the planning, management, and administration of motorized and non-motorized roads, primitive roads, and trails to ensure that public access, natural resources, recreational opportunities, and regulatory needs are considered.

3.18.2 Regulatory Framework

Executive Orders 11644 and 11989 contain guidelines for the controlled use of off-highway vehicle (OHVs) on public lands. These executive orders require that all BLM surface lands be designated as open, closed, or limited for OHV use (43 Code of Federal Regulations [CFR] 8340). In accordance with 43 CFR 8342.1, the BLM's regulations for OHV management, "the authorized officer shall designate all public lands as open, limited, or closed to [OHVs]." As such, all public lands within the CCFO Planning Area have been designated in one of three OHV designation categories.

In 2006, the BLM issued Instruction Memorandum No. 2006-173, which established policy for the use of terms and definitions associated with the management of transportation-related linear features. It also set a data standard and a method for storing electronic transportation asset data. According to the memorandum, all transportation assets are defined as follows:

- **Road:** A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.
- **Primitive Roads:** A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards.
- **Trails:** A linear route managed for human-powered, stock, or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

3.18.3 Regional Setting

BLM's CTTM program addresses all resource use aspects, such as recreational, traditional, casual, agricultural, commercial, and educational, and the accompanying modes and conditions of travel on public lands, not just motorized or off-highway vehicle (OHV) activities. Traditionally, the BLM's travel management program focused primarily on motor vehicle use. Within the framework of CTTM, all forms of travel, including travel by foot, horseback and other livestock, mechanized vehicles (such as bicycles), motorized vehicles (such as two-wheeled motorcycles and four-wheeled OHVs, cars, and trucks), and motorized and non-motorized boats.

Current vehicle management is based on the existing Hollister Resource Management Plan (RMP). This plan addressed a variety of concerns related to vehicle use, roadways, and resource protection, and provided guidelines for future road improvements, maintenance activities, and management decisions.

3.18.4 Current Conditions and Trends

Central Coast Field Office Planning Area

A network of Federal, State, and county roads provide access to the CCFO Planning Area. Figure 3.18-1 shows major public roads that provide regional access throughout the CCFO Planning Area boundary and surface transportation links between major population centers and BLM surface lands. Figure 3.18-1 also shows rail facilities within the CCFO Planning Area boundary.

BLM Roads and Trails

The BLM manages over 600 miles of roads and trails in the CCFO Planning Area for motorized and non-motorized use. Whenever possible, the BLM makes the public lands accessible, whether by foot, motorcycle, bicycle, horse, or car. Reasonable access is made available to persons engaged in valid uses such as mining claims, mineral leases, livestock grazing, and recreation.

Vehicle use within the Fort Ord, Joaquin Rocks, Panoche, and Tumey Hills areas is closed to casual public use. The remaining public lands managed by the field office limit motorized vehicle use to existing routes, except where closed by closure notices, and/or by activity level planning decisions. Within the CCFO Planning Area, the BLM manages approximately 502 miles of motorized roads and trails and 112 miles of non-motorized trails. This network ranges from two-wheel drive accessible routes, four-wheel drive "two-track" roads, and "single-track" motorized trails.

Existing roads and trails in the Planning Area are categorized based on the type of use and maintenance they receive as shown in Table 3.18-1.

Table 3.18-1. Miles of BLM Roads and Trails in the CCFO Planning Area

Road Class	Characteristics	Miles
2	Secondary and connecting roads – hard surface, concrete or asphalt, usually undivided with single lane characteristics.	32
3	Local, neighborhood, rural, and light-duty – hard surface, gravel or dirt, constructed, regularly maintained.	367
4	Unimproved – primitive, constructed, sedan clearance, not regularly maintained.	0
5	Four-wheel drive, primitive (two-track), constructed, high clearance required, not regularly maintained. All-terrain vehicle trail (less than 52 inches wide) or single-track motorized (dirt bike, horse).	113
6	Non-motorized trail (less than 52 inches wide).	112

Source: BLM, 2007.

Currently, public lands in the area are generally accessible by motorized vehicles to agency personnel (for resource management), to commercial enterprise (for use or extraction of public resources), and to the general public (for recreation and enjoyment of public lands). Road system management has focused on maintaining major access roads, which generally receive most of the recreation traffic. Corrective maintenance occurs as problems are identified and funds permit. Road construction has been limited to improving or upgrading road segments to improve access or to alleviate maintenance or environmental problems.

As shown in Table 3.18-1, there are more than 113 miles of primitive roads and trails for vehicles to access BLM public lands managed by the CCFO. While these roads and trails are open for OHV use, no designated OHV areas are located within the CCFO Planning Area (BLM, 2015).

Recreation (non-OHV) Access

Recreation activities such as equestrian riding, hunting, and rock hounding often require some level of motorized vehicle access. There are 16 key access points to recreation areas in the CCFO Planning Area. These currently have information boards or kiosks that identify the sites. These include Stockdale Mountain Access, Curry Mountain Access, Short Fence, Coalinga Mineral Springs, Condon Peak, Griswold Hills, Tumey Hills, and Panoche Hills.

Leases Subject to Settlement Agreement

The 14 non-NSO leases are located in the following two counties within the CCFO administrative boundary: eight leases in San Benito County and six leases in Monterey County. In San Benito County, the non-NSO leases are in a mountainous area that is less than 0.5 miles north of the San Benito Mountain Research Natural Area and approximately 4 miles south of the Panoche Hills South Wilderness Study Area. These leases are within the active Vallecitos oil and gas field or within approximately 7 miles of the field boundary. There would be no open roads within or near these leases.

In Monterey County, the non-NSO leases are located across two mountainous areas with the first area approximately 4 miles west of the City of San Ardo and 4 miles north of Lake San Antonio, and the second area approximately 9 miles south of the City of San Ardo and 1.5 miles east of Lake San Antonio. The Monterey County leases are within approximately 10 miles of the active San Ardo oil and gas field, which is generally located east of the non-NSO leases in Monterey County. Some open roads are located within these leases within the Williams Hill Recreation Area described below.

The following BLM-designated land use is located in the Monterey County non-NSO lease area:

- **Williams Hill Recreation Area.** This BLM-managed recreation area allows dispersed and developed camping, hunting, mountain biking, horseback riding, and Off-Highway Vehicle recreation. Off-Highway Vehicle access is limited to approximately 11 miles of designated open routes (BLM, 2013).

3.19 Lands and Realty

3.19.1 Introduction

The Bureau of Land Management (BLM) has established a number of natural resource management programs in order to address the large spectrum of natural resource values within its jurisdiction (BLM, 2013a). One of these resource management programs is for Lands and Realty. The Central Coast Field Office (CCFO) Lands and Realty program is aimed at managing the underlying land base that hosts and supports all BLM resources and management programs within its administrative area. The BLM works cooperatively to execute the CCFO Lands and Realty program with Federal agencies, the State of California, counties and cities, and other public and private landholders. Management actions (e.g., lease stipulations or areas closed to leasing) are incorporated in the Draft RMPA alternatives, and are fully described in Chapter 2.

3.19.2 Regulatory Framework

The Federal Land Policy and Management Act of 1976 (FLPMA) established BLM land use planning requirements, which serve as the basis for every on-the-ground action the BLM undertakes (BLM, 2005, pg. 1). As required by Section 202(c)(9) of the FLPMA, an RMPA and EIS must discuss State, local, and tribal land use plans that are germane in the development of land use plans for public lands. Therefore, Table 3.19-1 provides a listing of regulations and policies that may be applicable to the CCFO Planning Area. Additional State and local regulations may also apply to split-estate lands. State and local regulations and plans are subject to change and are listed for information purposes only. The application and enforcement of any applicable State and/or local agency regulations, plans, and policies lies with the State or local agencies with responsibility over the resources. BLM only has jurisdiction for enforcement of applicable Federal regulations.

Table 3.19-1. Applicable Plans, Policies, and Legal Authorities in the CCFO Planning Area

Plan	Policy / Statute / Regulation	Summary
Federal		
Code of Federal Regulations: Leases Permits, and Easements	43 CFR 2920	Establishes procedures for processing proposals for non-Federal use of public lands.
Recreation and Public Purposes Act	43 CFR 2912	Describes the terms and conditions of BLM leases and lease renewals.
	43 CFR 2740	Describes where and under what circumstances BLM authorizations for use, occupancy, and development (such as major leases and land use permits) may be granted.
Federal Land Policy and Management Act of 1976, as Amended	Section 302(b)	In managing public lands, the BLM must regulate the use, occupancy, and development of these lands through easements, permits, leases, licenses, published rules, or other appropriate instruments.
	Section 701(d)	Establishes that this Act does not permit oil shale recovery on any Federal land, other than Federal land that has been leased for the recovery of shale oil under the Act of February 25, 1920. The BLM is responsible for responding to requests regarding development on BLM-administered lands in a manner that balances diverse resource uses
Mineral Leasing Act of 1920, as Amended	Sections 13 through 21	Establishes the authority of the BLM to oversee oil and gas operations on Federal land.
Onshore Orders	Orders 1 through 7	Onshore Oil and Gas Orders implement and supplement the oil and gas regulations found at 43 CFR 3160 for conducting oil and gas operations on Federal and Indian lands.

Table 3.19-1. Applicable Plans, Policies, and Legal Authorities in the CCFO Planning Area

Plan	Policy / Statute / Regulation	Summary
BLM Instruction Memorandum	IM 2010-117	Establishes a process for ensuring orderly, effective, timely, and environmentally responsible leasing of oil and gas resources on Federal lands. The policy applies to the leasing of Federal minerals under BLM-administered surface, State-owned surface, and private surface estates.
State of California		
California Public Resources Code	Chapter 3, Sections 6801 through 6819	Provides the provisions relating to all State lands for oil, gas and mineral leases.
Local		
Alameda County General Plan	No policies pertaining to oil and gas were identified.	
Contra Costa County General Plan	Conservation Element	Policies in this section intend to ensure the continued viability of mineral extraction operations, to protect mineral resources from incompatible land uses, and to minimize and buffer the impact of mineral extraction on surrounding land uses and the natural environment.
Fresno County General Plan	Open Space & Conservation Element	Policies in this section intend to preserve the future availability of the county's mineral resources. Policies also seek to promote the orderly extraction of mineral resources while minimizing the impact of these activities on surrounding land uses and the natural environment.
Merced County General Plan	Natural Resources Element	Policies in this section intend to facilitate orderly development and extraction of mineral resources while preserving open space, natural resources, and soil resources and avoiding or mitigating significant adverse impacts.
Monterey County General Plan	Conservation & Open Space Element	Policies in this section provide for the conservation, utilization, and development of the county's mineral resources.
San Benito County Draft General Plan[1]	Geology, Soils, & Mineral Resources Element	Policies in this section intend to protect and support economically viable mineral resource extraction while avoiding land use conflicts and environmental impacts from current and historical mining activities.
San Benito County Fracking Ban, Measure J	In November 2014, a San Benito County Fracking Ban Initiative was approved by voters. The measure was designed to prohibit hydraulic fracturing and related gas and oil extraction activities, including acid well stimulation and cyclic steam injection. Measure J also banned any new gas or oil drilling activity in areas of the county zoned for residential or rural land use.	
San Francisco County/City General Plan	No policies pertaining to oil and gas were identified.	
San Joaquin County General Plan	Resources Element	Policies in this section intend to protect extractive resources from urban development or encroachment, and provide for the production of these resources while protecting people, property, and the environment from hazards caused by resource extraction.
San Mateo County General Plan	Mineral Resources Chapter	Policies in this section intend to protect the availability of mineral resources, encourage their extraction in a manner that minimizes adverse environmental impacts, and plan for the rehabilitation and reuse of mineral extraction areas.
Santa Clara County General Plan	Resource Conservation Chapter	Policies in this section intend to ensure continued availability of mineral resources, mitigate environmental impacts of extraction and transport, and reclaim sites for appropriate subsequent uses.
Santa Cruz County General Plan	Conservation and Open Space Chapter	Policies in this section allow for the orderly economic extraction of minerals with a minimal adverse impact on environmental and scenic resources and surrounding land uses.

Table 3.19-1. Applicable Plans, Policies, and Legal Authorities in the CCFO Planning Area

Plan	Policy / Statute / Regulation	Summary
Santa Cruz General Plan	Amendment to Policy 5.18.4	In April 2014, the San Cruz Board of Supervisors approved a resolution prohibiting oil and gas exploration and development in Santa Cruz County.
Stanislaus County General Plan	Conservation & Open Space Element	Policies in this section intend to manage extractive mineral resources to ensure an adequate supply without degradation of the environment.

1 - The proposed San Benito County General Plan Update includes policies specific to mineral resource extraction. No applicable policies were identified in the 1985 County General Plan.

Sources: Alameda County, 1994; BenitoLink, 2015; BLM, 1990, 2001, 2010; California Public Resources Code, Sections 6801 to 6819; Contra Costa County, 2005; Fresno County, 2000; Merced County, 2013; Monterey County, 2010; San Benito County, 2015; San Francisco County, 1996; San Joaquin County, 1992; San Mateo County, 1986; Santa Clara County, 1994; Santa Cruz County, 1994 and Santa Cruz County, 2014; Stanislaus County, 1995.

3.19.3 Regional Setting

The CCFO Planning Area is located in west-central California and encompasses 12 counties either in part or in full. Within the CCFO Planning Area, the BLM manages approximately 247,000 acres of subsurface mineral estate underlying Federal surface land and 546,000 acres of subsurface mineral estate underlying privately owned land, otherwise referred to as "split estate" lands (BLM, 2015). The public lands and mineral interests are primarily concentrated in the southern planning areas of Fresno, Monterey, and San Benito Counties. Adjacent landowners include private holdings and Federal, State, county, or local governments. An estimate of Federal mineral estate acreage in the planning and decision area is provided in Table 3.19-2.

Table 3.19-2. Estimate of Federal Mineral Estate within CCFO Administrative Boundary

County	BLM-Administered Surface Estate (acres)	Split Estate (acres)
Alameda	0	3,587
Contra Costa	0	1,880
Fresno	118,981	88,617
Merced	3,941	35,419
Monterey	46,160	202,080
San Benito	75,003	143,725
San Francisco	0	0
San Joaquin	0	1,969
San Mateo	0	400
Santa Clara	887	34,060
Santa Cruz	6	300
Stanislaus	1,320	33,803
Total	247,051	545,848

Source: BLM, 2015

3.19.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Current oil and gas development is concentrated within a limited area of the CCFO Planning Area. In the last decade, nearly all well development occurred in the Coalinga and Jacalitos oil fields (Fresno County), and the San Ardo and Lynch Canyon oil fields (Monterey County). The Federal share of mineral estate in these fields is approximately one percent, and as such, the BLM administers very little of the mineral estate in this area. Likewise, the Vallecitos oil fields located in San Benito County have very little production that occurs on BLM-administered mineral estate (BLM, 2014). Exploratory oil wells are not common in the CCFO Planning Area, and historically have been drilled on less than five percent of the leases issued on BLM-administered lands (BLM, 2014).

As described above, existing oil and gas leases within the CCFO Planning Area are primarily located within Fresno County, Monterey County, and San Benito County. Future oil and gas development is also likely to occur in these regions. Characteristics unique to each county include the following:

- **Fresno County.** An abundance and wide variety of mineral resources are present in this county. Extracted resources include aggregate products (sand and gravel), fossil fuels (oil and coal), metals (chromite, copper, gold, mercury, and tungsten), and other materials used in construction or industrial applications (asbestos, high-grade clay, diatomite, granite, gypsum, and limestone). Aggregate and petroleum are the county's most significant extractive resources and play an important role in maintaining the county's overall economy (Fresno County, 2000, pg. 5-9).
- **Monterey County.** This county is characterized by large rural areas that are predominately used for agricultural purposes. Substantial oil reserves are believed to underlay parts of the Salinas Valley; the San Ardo oil field is the largest in Monterey County. In 2006, the San Ardo oil field ranked 41st in the nation in terms of oil production (Monterey County, 2008, pg. 4.5-5).
- **San Benito County.** This county is largely rural, with over 90 percent of its land used for farming, ranching, forestry, or other public uses (San Benito, 2010a, pg. 1-5). San Benito County is not considered a major oil-producing region in California compared to other counties. Reserves within the county are estimated to be 101 million oil barrels (Mbbl) of oil and 63 million cubic feet (MMcf) of natural gas, while the largest oil fields in the State contain up to 598,393 Mbbl of oil reserves and 329,109 MMcf of gas reserves (San Benito, 2010b, pg. 8-68).

Leases Subject to Settlement Agreement

The 14 non-NSO leases are located in the following two counties within the CCFO Planning Area: eight leases in San Benito County and six leases in Monterey County. In San Benito County, the non-NSO leases are proposed in a mountainous area that is approximately 2.5 miles north of the San Benito Mountain Research Natural Area and approximately 5.6 miles south of the Panoche Hills South Wilderness Study Area; some of these leases would be located within active oil and gas fields. In Monterey County, the non-NSO leases are located across two mountainous areas with the first area approximately 3 miles west of the City of San Ardo and 4.5 miles north of Lake San Antonio, and the second area approximately 9.4 miles south of the City of San Ardo and 1 mile northeast of Lake San Antonio. Active oil and gas fields are located to the north and east of the non-NSO leases in Monterey County. The following BLM-designated land use is located in the Monterey County non-NSO lease area:

- **Williams Hill Recreation Area.** This BLM-managed recreation area allows dispersed and developed camping, hunting, mountain biking, horseback riding, and Off-Highway Vehicle recreation. Off-Highway Vehicle access is limited to approximately 11 miles of designated open routes (BLM, 2013b).

3.19.5 BLM Management Considerations for Lands and Realty

Management challenges identified for lands and realty in the CCFO Planning Area are based, in part, on historic activities and trends, as well as on current and future needs of public resources. Management challenges include managing BLM surface lands to adequately meet the needs of multiple uses per the FLPMA; improving the management of natural, public, and historic resources; bringing into public ownership lands with high public resource values; consolidating land and mineral ownership patterns for more streamlined management of resources and BLM programs; and disposing of lands identified for disposal. In order to accommodate multiple uses in a manner consistent with CCFO management objectives and plans, the BLM must identify public lands or resources for which the following management tools apply: (1) land use authorizations (e.g., leases, permits, Right-of-way (ROW) grants); (2) land tenure adjustments (e.g., sales, exchanges, donations, purchases); and (3) classifications and withdrawals.

Land Use Authorizations

Section 302 of the FLPMA provides the BLM's authority to issue leases and permits for the use, occupancy, and development of public lands. Leases and permits are issued for purposes such as ROWs and utility corridors, construction equipment storage sites, assembly yards, oil rig stacking sites, and water pipelines and well pumps related to irrigation and non-irrigation facilities (BLM, 2009).

As described in Chapter 1, the Draft RMPA/EIS discusses management of oil and gas resources in the CCFO Planning Area consistent with the 2015 RFD Scenario. Management actions considered in this RMPA/EIS include areas that would be closed to oil and gas leasing as identified for each alternative (see Sections 2.6 through 2.10). Areas that are open to oil and gas leasing may be subject to one of three types of stipulations: Controlled Surface Use, Timing Limitation, or No Surface Occupancy. These stipulations are fully described in Chapter 2.

Land Tenure Adjustments

Land ownership (or land tenure) adjustment refers to those actions that result in the retention of public land, disposal of public land, or the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted. Tracts of land that are designated in BLM land use plans as potentially available for disposal are more likely to be conveyed out of Federal ownership through an exchange rather than a sale. During an exchange, the BLM may accept title to any non-Federal land in exchange for land under Federal ownership, which allows for more efficient and better management of resource values on BLM lands with contiguous ownership. This preference toward exchange over sale is established in BLM policy. Acquisition of and interests in lands are important components of the BLM's land tenure adjustment strategy, and can be accomplished through several means, including exchange, purchase, donation, and condemnation. Lands and interests in lands are acquired for the following actions:

- Improve management of natural resources through consolidation of Federal, State, and private lands;
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources; and
- Implement specific acquisitions authorized or directed by acts of Congress.

Management of land tenure adjustments (e.g., acquisitions and disposal areas) is discussed in Section 3.18 of the 2007 HFO RMP. None of the Draft RMPA alternatives would include adjustments to land tenure in the CCFO Planning Area.

Classifications

Land classification is a process required under specific laws to determine the suitability of public lands for certain types of disposal or lease, or suitability for retention and multiple use management. Most land classifications also segregate public lands from operation of some or all of the public land laws and mineral laws. Public land laws refer to the body of laws governing land disposal (e.g., sales, exchanges). None of the alternatives analyzed in this EIS would alter the land classifications within the CCFO Planning Area, as adopted in the 2007 HFO RMP.

Withdrawals

A withdrawal is a formal action that sets aside, withholds, or reserves Federal lands for public purposes. Withdrawals accomplish one or more of the following:

- Transfer total or partial jurisdiction of Federal land between Federal agencies;
- Dedicate Federal land to a specific purpose
- Segregate (close) Federal land from operation of some or all of the public land laws and (or) mineral laws. All the existing withdrawals segregate from operation of the public land laws, unless the surface estate is in nonfederal ownership.

Current management of withdrawals is discussed in Section 3.18 of the 2007 HFO RMP. None of the alternatives analyzed in this EIS would require withdrawals in the CCFO Planning Area.

3.20 Utility Corridors and Communication Sites

This section describes the existing utility corridors and communication sites within the CCFO Planning Area boundary that would be applicable to the Proposed RMPA. Transportation corridors within the CCFO Planning Area are discussed in Section 3.18 (Transportation and Access).

3.20.1 Introduction

In 2009, the BLM amended its land use plans in 11 contiguous western states in order to designate corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land (BLM, 2009). Designated energy corridors on Federal lands provide pathways for future pipelines as well as long-distance electrical transmission lines that are expected to help relieve congestion, improve reliability, and enhance the national electric grid.

As part of this designation process, the BLM also adopted interagency operating procedures to provide coordinated, consistent interagency management procedures for permitting rights-of-way (ROWs) within the corridors. A ROW grant is an authorization to use a specific piece of public land for certain projects, such as developing roads, pipelines, transmission lines, and communication sites. The ROW grant authorizes rights and privileges for a specific use of the land for a specific period of time.

The BLM manages ROWs through its system of designated corridors and has encouraged the placement of new facilities within established corridors. Deviations from designated corridors may be permitted based on the type and need of the proposed facility, and lack of conflicts with other resource values and uses. Overlapping or adjacent ROWs are issued whenever possible. Generally, the use of designated ROW corridors for ROW grants is actively encouraged by the BLM; however, the presence of a designated ROW corridor or a system of ROW corridors does not preclude the granting of a ROW on public land outside the designated corridor, if appropriate.

3.20.2 Regulatory Framework

The following regulations and policies are applicable to utility corridors and communication sites in the CCFO Planning Area.

Energy Policy Act of 2005 – Section 368 Energy Right-of-Way Corridors

Section 368 of the Energy Policy Act (42 USC 15801 et seq.) authorizes the following actions for the secretaries of the departments of Commerce, Defense, Energy, and the Interior: (1) designate corridors for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities on Federal land in the 11 contiguous western states; (2) perform any environmental reviews that may be required to complete the designation of such corridors; and (3) incorporate the designated corridors into the relevant agency land use and resource management (or equivalent) plans.

In November 2008, the Department of Energy, the BLM, U.S. Forest Service, Department of Defense, and U.S. Fish and Wildlife Service issued a final West-Wide Energy Corridor Programmatic Environmental Impact Statement (PEIS) that evaluated issues associated with the designation of energy corridors on Federal lands in 11 western states. Based upon the information and analyses developed in that PEIS, the Federal agencies could amend their respective land use plans by designating as an energy corridor one or more of the proposed energy corridors identified in the document (DOE and BLM, 2008).

In order to comply with the 2005 Energy Policy Act, the BLM amended 92 land use plans in the 11 contiguous western states to designate corridors on BLM-administered public lands (BLM, 2009, pg. 1). The BLM's Approved RMP Amendments/ROD for Designation of Energy Corridors (2009) includes documentation of the BLM's decisions in identifying these energy corridors.

In July 2012 the BLM, U.S. Forest Service, and Department of Energy entered into a settlement agreement with various nongovernmental organizations to resolve a lawsuit brought by the nongovernmental organizations after the agencies approved the corridors designated per Section 368. One of the requirements of the agreement was that the BLM and the U.S. Forest Service make future recommendations for revisions, deletions, and additions to the Section 368 corridor network consistent with applicable law, regulations, and agency policy and guidance and that they would consider the following general principles in future siting recommendations:

- Corridors are thoughtfully sited to provide maximum utility and minimum impact to the environment.
- Corridors promote efficient use of the landscape for necessary development.
- Appropriate and acceptable uses are defined for specific corridors.
- Corridors provide connectivity to renewable energy generation to the maximum extent possible while also considering other sources of generation, in order to balance the renewable sources and to ensure the safety and reliability of electricity transmission.

43 CFR 2806 – Corridor Designation

Part 2800 (Rights-of-Way, Principles and Procedure) of the Code of Federal Regulations establishes the Department of Interior's management procedures for ROWs. In accordance with Subpart 2806 (Designation of Right-of-Way Corridors), the BLM may designate ROW corridors to include any existing utility corridor that is capable of accommodating an additional compatible ROW. ROW grants would generally be confined to designated corridors, although the BLM may grant separate ROWs outside of a designated corridor if deemed appropriate by the authorized officer.

Pipeline and Hazardous Materials Safety Administration

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) develops and enforces regulations for the safe, reliable and environmentally sound operation of the nations' pipeline transportation system. In PHMSA, the Office of Pipeline Safety ensures safety in the design, construction, operation and maintenance, and spill response planning of oil, natural gas and hazardous liquid transportation per the duties regarding pipeline safety set forth in 49 USC Section 60101 et seq. and 49 CFR Section 190.1. The regulations apply to the owners and operators of the facilities and cover the design, installation, inspection, emergency plans and procedures, testing, construction, extension, operation, replacement, and maintenance of pipeline facilities transporting oil, gas, and hazardous liquid. The regulations require operators of gas pipelines to participate in a public safety program, such as a one-call system that would notify the operator of any proposed demolition, excavation, tunneling, or construction that would take place near or affect the facility.

3.20.3 Regional Setting

The location of electricity, natural gas, and communication facilities is typically dependent upon the location of demand and utility service areas. Areas of greater population require a more extensive utility supply network. As summarized in the BLM's RMP/ROD for Designation of Energy Corridors (BLM, 2009, pg. 12), the western states have a critical need for long-distance energy transport infrastructure due in part to these states' unique geography and population distribution, where fuel sources and energy generation facilities are often remotely located and large population centers are spread far apart. These factors result in an electricity transmission grid characterized by high-voltage transmission lines spanning very long distances. Transmission system congestion can lead to rapid rises in electricity prices, and severe congestion may lead to loss of electricity supplies and blackouts in some areas.

3.20.4 Current Conditions and Trends

Central Coast Field Office Planning Area

Figure 3.20-1 shows the location of existing transmission lines, pipelines, and pipeline facilities that constitute utility corridors within the CCFO Planning Area. As discussed in Section 3.17 (Social and Economic Conditions), the concentration of utility infrastructure (i.e., pipeline facilities, pipelines, transmission lines) around the San Francisco Bay areas of Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco Counties is consistent with the greater population size of this region relative to other communities within the CCFO Planning Area. Existing utility infrastructure within the CCFO Planning Area is also clustered in northern Monterey County (due to a greater population density than in the southern area) as well as in southeastern Fresno County (due to active oil and gas wells).

The electricity and natural gas utility providers in the CCFO Planning Area primarily include investor-owned utilities, which are private utility providers regulated by the California Public Utilities Commission. Some publicly owned utilities (i.e., municipal districts, city departments, irrigation districts, or rural cooperatives) also provide services to communities within the CCFO Planning Area. Publicly owned utilities are subject to local public control and regulation. Electricity providers in the CCFO Planning Area include Pacific Gas and Electric, Silicon Valley Power, Merced Irrigation District, Turlock Irrigation District, and Lodi Electric Utility. Natural gas utility providers include Pacific Gas and Electric, City of Palo Alto Utilities, and Southern California Gas (DOC, 2015).

Communication facilities on public lands include broadcast uses (e.g., radio, broadcast translator, cable television, or television broadcast) and non-broadcast uses (cellular telephone, commercial mobile radio service, facility manager, local exchange network, microwave, private communication uses, passive reflector, private mobile radio service, wireless internet service provider, Wi-Fi, or WiMAX) (BLM, 2012). Existing communication sites are located in the San Benito Management Area (i.e., Call Mountain), Central Coast Management Area (i.e., Fort Ord National Monument, Carmel Valley, and Stockdale Mountain), Salinas Management Area (i.e., Priest Valley), and San Joaquin Management Area (BLM, 2006).

Leases Subject to Settlement Agreement

The 14 non-NSO leases are located within or adjacent to active oil and gas fields in San Benito County, and approximately 2 miles to the south and west of active oil and gas fields in Monterey County. Existing pipelines and pipeline facilities are located in the region to provide service to existing oil and gas facilities.

3.21 Wild and Scenic Rivers

3.21.1 Introduction

The Bureau of Land Management (BLM) applies planning and management guidance for special designations within the National System of Public Lands created by presidential proclamations or acts of Congress. The Wild and Scenic Rivers Act of 1968 (Public Law 90-542) was passed by Congress to preserve riverine systems that contain outstanding features. The law was enacted during an era when many rivers were being dammed or diverted, and is intended to balance this development by ensuring that certain rivers and streams remain in their free-flowing condition. The BLM is mandated to evaluate stream segments on public lands as potential additions to the National Wild and Scenic Rivers System during the Resource Management Plan (RMP) process under Section 5(d) of the Act. Formal designation as a National Wild and Scenic River (NWSR) requires Congressional legislation, or designation can be approved by the Secretary of Interior if nominated by the governor of the state containing the river segment.

In 2014, the BLM considered waterways within the Central Coast Field Office (CCFO) Planning Area boundary for potential inclusion in the Wild and Scenic Rivers System during its analysis for the Clear Creek Management Area RMP/EIS (BLM, 2014; Appendix VI). This section describes the eligible river segments that would be applicable to the Proposed RMPA. Impacts to eligible river segments managed by the BLM within the CCFO Planning Area boundary are discussed in Section 4.21.

3.21.2 Regulatory Framework

The Wild and Scenic Rivers Act of 1968 established a NWSR System to protect outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values and to preserve the river or river section in its free-flowing condition. The Act purposefully strives to balance dam and other construction at appropriate sections of rivers with permanent protection. To accomplish this, it prohibits Federal support or approval for actions such as the construction of dams or other instream activities that would harm the river's free-flowing condition, water quality, or "outstanding remarkable values." The Act designated a number of river segments for immediate inclusion in the system and prescribed the methods and standards by which other rivers may be added to the system.

Rivers are generally designated by Congress and administered by either a Federal or State agency. Designated segments need not include the entire river and may include tributaries. For federally administered rivers, the designated boundaries generally average one-quarter mile on either bank in the lower 48 states and one-half mile on rivers outside national parks in Alaska in order to protect river-related values (NWSRS, 2015a).

Once a river or river segment is designated, it is added to the NWSR System. The NWSR System consists of three types of rivers:

- **Recreation** – rivers or sections of rivers that are readily accessible by road or railroad, that might have some development along their shorelines, and that might have undergone some impoundments or diversion in the past.
- **Scenic** – rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped, but accessible in places by roads.
- **Wild** – rivers or sections of rivers free of impoundments and generally inaccessible, except by trails, with essentially primitive watersheds or shorelines, and unpolluted waters.

Regardless of classification, rivers are administered with the goal of protecting and enhancing the outstanding remarkable values that lead to their designation and maintaining their free-flowing character-

istics. Designation does not, however, affect existing water rights or the existing jurisdiction of states and the Federal government over waters as determined by established principles of law. Designation places no additional Federal authority over private lands within the corridor.

Wild and Scenic River Evaluation Process

In accordance with its policy and program direction for Wild and Scenic Rivers (BLM Manual 6400), the BLM identifies and evaluates "all rivers on BLM-administered lands to determine if they are appropriate for addition to the Wild and Scenic Rivers System" (BLM, 2012; Section 1.6). In this process, streams and rivers are first evaluated for their eligibility as potential additions to the NWSR System, followed by a determination of the suitability of eligible streams (i.e., suitability being a higher standard than eligibility). Ultimately, inclusion in the NWSR System requires action by Congress. Until Congress makes a final decision regarding designation, protective management is afforded to all eligible river segments as necessary to ensure that the existing qualities upon which their eligibility is based are not degraded.

The NWSR System study process includes the following steps:

- **Eligibility Determination.** In order to be eligible for inclusion in the NWSR System, a river segment must be free flowing and contain at least one river-related outstanding remarkable value. Eligible segments are preliminarily classified as wild, scenic, or recreational and then carried forward and studied in more detail to determine if they are suitable for inclusion in the NWSR System.
- **Suitability Determination.** All eligible waterways are reviewed to determine if they are suitable for inclusion in the NWSR System. The Wild and Scenic Rivers Act and BLM Manual 6400 list a number of factors that should be considered when assessing the suitability of waterways for inclusion in the NWSR System (e.g., status of land and mineral ownership along the river corridor; reasonably foreseeable uses to be enhanced, foreclosed or curtailed; cost of acquiring the lands and administering the area; and identifying the Federal agency with future oversight of the area).

All river segments found to be eligible for inclusion in the NWSR System are placed under protective management by the BLM. Subject to valid existing rights, the BLM is required to protect the free-flowing characteristics and outstanding remarkable values in the stream corridors. The BLM must also protect the corridor from modifications that would impact the tentative river classification (i.e., change the classification potential from Wild to Scenic, or from Scenic to Recreational). These management restrictions apply only to public lands. Protective management remains in effect until Congress makes a final decision regarding designation.

3.21.3 Regional Setting

In 2014, the BLM completed a Wild and Scenic River Inventory as part of its Record of Decision and Approved Resource Management Plan for the Clear Creek Management Area (Appendix VI). The Wild and Scenic River Inventory identified 11 river segments in the CCFO Planning Area as eligible for inclusion in the NWSR System (BLM, 2014; Appendix VI). Figure 3.21-1 shows the location of these eligible segments within the CCFO Planning Area, and Table 3.21-1 summarizes the information for each segment.

Table 3.21-1. Eligible Wild and Scenic Rivers in Central Coast Field Office Planning Area

River Name / Segment	BLM Length (miles)	Segment / Reach Identification	Outstanding Remarkable Value
Picacho Creek	2.0	Coalinga SM, T18S., R12E., SEC 19, 30, T18S., R11E., SEC 25	Recreational, other
White Creek	2.8	Coalinga SM, T19S., R13E., SEC 4, 8, 9, 17	Historical, cultural
Larious Creek	2.5	Coalinga SM, T17S., R11E., SEC 26, 35, 36	Historical, cultural

Table 3.21-1. Eligible Wild and Scenic Rivers in Central Coast Field Office Planning Area

River Name / Segment	BLM Length (miles)	Segment / Reach Identification	Outstanding Remarkable Value
East Fork of San Carlos Creek	1.4	Coalinga SM, T18S., R12E., SEC 2, T17S., R12E., SEC 22, 26, 35	Geological
San Carlos Creek	1.0	Coalinga SM, T18S., R12E., SEC 4, 5	Geological, historical
San Benito River (1)	0.8	Coalinga SM, T18S., R12E., SEC 32, 5	Scenic, geological, other
San Benito River (2)	0.5	Coalinga SM, T18S., R12E., SEC 25, 26	Scenic, geological, other
San Benito River (3)	0.3	Coalinga SM, T17S., R10E., SEC 16, 17	Scenic, geological, other
Cantua Creek	3.8	Coalinga SM, T18S., R12E., SEC 1, 12, 13, 24 T18S., R13E., SEC 5, 6	Scenic, recreational
Clear Creek and Tributaries	7.0	Coalinga SM, T18S., R12E., SEC 8, 9, 17 T18S., R11E., SEC 1, 11, 12, 15, 16	Scenic, recreational, fish & wildlife, geological, historical, cultural, other
Sawmill Creek	1.5	Coalinga SM, T18S., R12E., SEC 1, 4, 15, 22	Fish & wildlife, historical, other

SM= BLM Surface Management Map
"Other" Outstanding Remarkable Value includes Ecological values
Source: BLM, 2014; Appendix VI

2014 Suitability Determination by BLM

The eligible river segments listed in Table 3.21-1 were reviewed by the BLM to determine if any are suitable for inclusion in the NWSR System. The suitability study report that was included in the BLM's 2014 Wild and Scenic River Inventory describes the characteristics that do or do not make the stream segment a worthy addition to the system, the current status of land ownership and use in the area, as well as the reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the system (BLM, 2014; Appendix VI). None of the eligible river segments within in the CCFO Planning Area listed in Table 3.21-1 were recommended for inclusion in the NWSR System. The BLM found that many of the watersheds have been substantially modified through past mining and logging activities and the associated construction of roads and trails, and concluded that the resulting landscapes would not broaden the representation of key ecosystems within the NWSR System (BLM, 2014; Appendix VI).

As described in BLM Manual 6400, Section 3.5, the BLM's policy goal for eligible rivers is to manage their free-flowing condition, water quality, tentative classification, and any outstandingly remarkable values until Congress designates the river or releases it for other uses. Section 3.5 also states that BLM has broad discretionary authority, on a case-by-case basis through project-level decisionmaking and the NEPA processes, in regards to management of eligible river segments.

3.21.4 Current Conditions and Trends

Central Coast Field Office Planning Area

There is one designated NWSR that is within the CCFO Planning Area boundary but is not located on land administered by the BLM. The Big Sur River was designated in 1992 and is managed by the U.S. Forest Service. Classified as a "Wild" river, it extends 19.5 miles through the Los Padres National Forest to the boundary of the Ventana Wilderness (NWSRS, 2015b). The Big Sur River would not cross or be located in the vicinity of Federal mineral estate (see Figure 3.21-1).

Leases Subject to Settlement Agreement

There are no designated NWSR within the leases subject to settlement agreement.

Chapter 4

Environmental Consequences

4. Environmental Consequences

4.1 Introduction

This chapter analyzes the environmental consequences, or impacts, that are expected to occur as a result of implementing the management actions described in Chapter 2. The depth and breadth of the impact analyses presented in this chapter is commensurate with the level of detail of the management actions presented in Chapter 2, and on the availability and/or quality of data necessary to assess impacts. The baseline used for expected impacts is the current conditions in the Planning Area described in Chapter 3 (Affected Environment). The analysis for the proposed plan amendment is presented by resource and organized into the following sections:

- Summary of goals and management actions that affect the resource; and
- Analysis of direct and indirect impacts and mitigation specific to the proposed plan amendment on an area-wide basis, and then to the leases subject to litigation.

Cumulative impacts are discussed in Chapter 5 (Cumulative Impacts).

4.1.1 Impact Analysis Methodology

In general, impacts to resources in the Planning Area are analyzed by determining the effects on a given resource from oil and gas leasing and development management actions that would occur for each alternative under the 2015 RFD Scenario (see Appendix B).

Impacts are related to desired future conditions by comparing the impacts from implementation of management actions to achieving the goals and objectives specified for each resource/resource program and to the existing environmental conditions. For management actions that do not achieve the stated goals and objectives or that generally do not meet BLM's multiple use mandate, or that result in significant negative changes to physical or social conditions, the impact is characterized as adverse. For management actions that do achieve goals and objectives, the impact is characterized as beneficial. If a management action does not specifically affect a desired future condition, there is no impact. Finally, if there is not enough specificity to determine whether a management action would achieve the goals and objectives, the impact can only be described in general terms.

4.1.2 Types of Impacts to be Addressed

Direct and Indirect Impacts

Terms referring to the intensity, context (geographic extent), and duration of impacts are used in this chapter. Impacts are not necessarily only negative; positive benefits are specified as such. The standard definitions for terms used in the impacts analysis include the following:

- **Adverse** – the effect is negative.
- **Beneficial** – the effect is positive.
- **Negligible** – the effect is at the lower level of detection; change would be hard to measure.
- **Minor** – the effect is slight but detectable; there would be a small change.
- **Moderate** – the effect is readily apparent; there would be a measurable change that could result in small but permanent change.
- **Major** – the effect is large; there would be a highly noticeable, long-term, or permanent measurable change.

- **Localized** – the effect occurs in a specific site or area.
- **Temporary** – the effect occurs only during implementation of a management action.
- **Short-term** – the effect occurs only for a short time after implementation of a management action.
- **Long-term** – the effect occurs for an extended period after implementation of a management action.
- **Permanent** – the effect is irreversible; the resource would never revert to current conditions.
- **Direct** – effect that occurs as a result of actions on the resource being addressed.
- **Indirect** – effect that occurs as a result from actions on other resources.

Off-site and Cumulative Impacts

Off-site impacts are impacts that occur to resources or lands outside the Planning Area as a result of BLM oil and gas leasing management actions taking place within the Planning Area.

Cumulative impacts are addressed in Chapter 5 (Cumulative Impacts). Cumulative impacts are defined as:

> *The impact on the environment which results from the incremental impact of the action when added to past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts can result from similar projects or actions, as well as projects or actions that have similar impacts* (40 CFR 1508.7).

The time frame for the cumulative impacts analysis begins at the anticipated time the RMPA would take effect, and extends for the 15- to 20-year life of the plan.

4.1.3 Incomplete or Unavailable Information

Impacts are quantified where possible. Impacts are sometimes described using ranges of potential impacts or in qualitative terms. In the absence of quantitative data, impacts are described based on the professional judgment of the interdisciplinary team of technical specialists using the best available information. Impacts analysis based on incomplete or unavailable information is identified where applicable in this chapter.

4.1.4 Assumptions

Several general assumptions were made to facilitate the analysis of potential impacts. The assumptions listed below are common to all resources. Other assumptions specific to a particular resource are listed under that resource.

- Changes in BLM policies have been made since the 2007 RMP was approved.
- Funding and personnel would be sufficient to implement any alternative described.
- The approved RMPA would be in effect for 15 to 20 years.

4.2 Energy and Minerals

Minerals management considers the impacts on commercial/industrial development, casual use, and recreational collection of mineral resources and on energy sources. The RMPA addresses potential future oil drilling of up to 37 new wells and the associated 206 acres of ground disturbance and potential impacts that would restrict or limit the development of solid mineral resources on Federal mineral estate. An impact would occur if oil well drilling and development restricted access to other minerals or energy development.

4.2.1 Introduction

Oil and gas exploration and production and limited salable mineral production currently take place in the Central Coast Field Office Planning Area. Currently, no commercial-scale solar and wind energy development exist within the CCFO Planning Area on BLM-administered lands. Commercial-scale wind is unlikely to be developed on BLM-administered lands in the CCFO Planning Area because wind resources are poor. It is unlikely that commercial-scale solar projects would be developed on BLM-administered land in the CCFO Planning Area because most of the land does not have less than 5 degree slope. While it is possible to build solar projects on areas with a greater than 5 degree slope, such projects would require more grading and would be less commercially viable at a commercial-scale. These resources are not discussed further in this section.

This RMPA/EIS goal for energy and mineral resource management is to allow development of energy and mineral resources to meet the demand for energy and mineral production while protecting natural and cultural resources in the area.

To achieve this goal, the following objectives related to oil and gas leasing and development would be established:

- Balance responsible mineral resource development with the protection of other resource values;
- Provide opportunities for mineral exploration and development under the mining and mineral leasing laws; and
- Provide mineral materials needed for community and economic purposes.

The Management Actions from the 2007 HFO RMP and new management actions for oil and gas leasing are presented in Section 2.10.

Types of Impacts

Direct impacts to minerals are considered to be those that prohibit the development of Federal mineral estate. Indirect impacts include where new oil well drilling sites or expansion of existing fields restrict access to surface mineral deposits and limit the overall production. It is unlikely that a single new well site covering 1 to 2 acres would completely affect the feasibility of developing a profitable commercial sand and gravel or building stone quarry. Multiple well pads could potentially reduce the feasibility of developing a sand and gravel or building stone quarry. In some cases it may be possible to access deep petroleum resources using directional drilling techniques without limiting future development of mineral deposits. Shared access roads and joint development of solid mineral and oil and gas resources, where coincident, are commonly practiced where feasible and without conflict.

Assumptions

- The same level of oil and gas development under the 2015 RFD Scenario would apply to Alternatives A, C, D, and E (i.e., up to 37 exploratory and development wells on 206 acres of disturbance). Alternative B assumes up to 32 exploratory and development wells on up to 179 acres of disturbance.

- All surface-disturbing activities related to the 2015 RFD Scenario would likely occur on BLM-administered mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO Planning Area but could occur in any open areas throughout the CCFO Planning Area.
- Most new oil and gas well locations developed under the 2015 RFD Scenario would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities.
- Sand and gravel needed for construction on the oil and gas leases would be minor given the limited amount of new roads. Sand used in well stimulation generally is not mined in California (DOC, 2015).
- Ancillary facilities for oil and gas production (e.g., pipelines, compressor stations, etc.) and downstream activities such as oil processing at refineries and natural gas transmission and distribution are separate activities that would not be substantially affected by the RFD Scenario, aside from the need to carry produced oil and gas to the existing transmission pipeline network over a distance that is likely to be less than 10 miles.

4.2.2 Impacts Common to All Alternatives

Drilling of up to 37 new oil and gas wells on Federal oil and gas leases with approximately 206 acres of surface land occupancy could locally impact access to surface mineral deposits. An impact would occur if some or all of the mineral resource could not be developed. However, the temporary nature of many oil well sites would not completely restrict access to other minerals. Similarly, existing mines would not completely interfere with the future oil well drilling as directional drilling techniques would make petroleum targets accessible. Consequently, temporary restrictions to mineral access would occur only where future well drilling sites are permitted within known mineral resource areas. The worst-case scenario (i.e., 37 wells and 206 acres of surface disturbance) is assumed for each alternative herein.

For all alternatives, oil and gas exploration and development could occur in any of the Federal estate lands within the CCFO Planning Area and could potentially affect access to surface mineral deposits.

For all alternatives, the leases subject to the settlement agreement are located in hillside areas not currently supporting active mines. The Vallecitos field is located north of the historic New Idria mercury mine. The Carmel Stone Mine (Section 28, T22S, R9E), a Monterey Shale surface mine, is located within one lease located approximately 6 miles west of San Ardo and just north of Williams Hill.

4.2.3 Impacts of Alternative A (No Action)

Alternative A has the most acres open (available with standard lease stipulations and endangered species stipulations) to oil and gas leasing and provides the most flexibility for oil and gas development and would not affect potential future operations. Impacts to surface mineral deposits would be the same as described in Section 4.2.2 but could occur within a larger area.

Alternative A would utilize the 2015 RFD Scenario while continuing current management under the existing 2007 HFO RMP (BLM, 2007).

The existing 2007 HFO RMP developed the following Management Actions under other resource programs that could impact energy and mineral development:

- **Social and Economic Conditions.** Management actions specified for social and economic conditions address varying degrees of promoting commodity development in the Planning Area, which can affect the degree to which energy and minerals development can be implemented economically.
- **Transportation and Access.** Several management actions for transportation and access impose limitations on vehicle use, development of new roads, and closure of existing road networks in the Planning

Area. Since energy and minerals development requires the use of vehicles and potentially new road construction, this resource program has the potential to significantly affect the ability to develop these resources.

- **Land Tenure Adjustments.** Disposal of BLM-managed lands with high potential for energy or mineral production would have an adverse impact on the development of these resources if the lands acquired were restricted for such use, either by private owners or other public entities.

Mitigation

Mitigation Measure EM-1 addresses the potential conflict of access between surface mineral resources and future oil well drilling. The measure outlines the procedures that could be implemented to lessen the degree of potential adverse energy and mineral impacts from development of oil and gas leases under Alternative A. During review of whether to accept or deny project proposals, BLM managers could decide to attach additional stipulations or measures, such as the following, to minimize or avoid potential energy and mineral effects.

EM-1 **Review Mineral Potential.** A lease application shall include a review of historic and recent mining activity within or directly adjacent to the lease boundary. The review shall also include a review of mineral resource potential for metallic deposits, sand and gravel, diatomaceous earth, building stone and other industrial minerals. The review may include opportunities to share access roads and to locate new well sites to avoid areas with moderate to high potential for these resources.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued. As such, no impact would occur to potential lease holders.

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in areas near or within historic or recent mine areas. Consequently, implementation of Mitigation Measure EM-1 is required before granting the lease or included as a lease stipulation.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.2.4 Impacts of Alternative B

Alternative B would limit leasing to existing oil and gas fields defined by DOGGR with 754,000 acres closed to leasing. This alternative provides the least flexibility for oil and gas operators, and would limit the locations where future exploratory wells could be drilled. The open areas could experience drilling of up to 32 new wells and would have the same potential for creating mineral access restriction in these areas. Impacts to surface mineral deposits would be the same as described in Section 4.2.2 but could occur within a smaller area.

Mitigation

Mitigation Measure EM-1 would apply to Alternative B.

Leases Subject to Settlement Agreement

Under Alternative B, the majority of BLM-managed areas that contain the 14 non-NSO leases would be closed to leasing.

Under Alternative B, the majority of BLM-managed areas that contain the 14 non-NSO leases would be closed to leasing. The area that remains open would not be near existing mineral operations so the leases would be unlikely to have any effects to minerals.

4.2.5 Impacts of Alternative C

Alternative C would limit leasing to high oil and gas occurrence potential areas with over 394,400 acres closed to leasing. This alternative provides less flexibility for oil and gas operators than Alternative A but more than Alternative B. The open areas could experience drilling of up to 37 new wells and would have the same potential for creating mineral access restriction. Impacts to surface mineral deposits would be the same as described in Section 4.2.2 but could occur within a smaller area.

Mitigation

Mitigation Measure EM-1 would apply to Alternative C.

Leases Subject to Settlement Agreement

The majority of the14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be open. As such, no impact would occur to the potential lease holders.

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in areas near or within historic or recent mine areas. Consequently, implementation of Mitigation Measure EM-1 is required before granting the lease or included as a lease stipulation.

4.2.6 Impacts of Alternative D

Alternative D would limit leasing to Federal mineral estate underlying BLM surface estate areas with 655,400 acres closed to leasing. This alternative provides less flexibility for oil and gas operators than Alternative A and Alternative C but more than Alternative B. The open areas could experience exploration by up to 37 new wells and would have the same potential for creating mineral access restriction. Impacts to surface mineral deposits would be the same as described in Section 4.2.2 but could occur within a smaller area.

Mitigation

Mitigation Measure EM-1 would apply to Alternative D.

Leases Subject to Settlement Agreement

Under Alternative D, the majority of BLM-managed areas that contain the 14 non-NSO leases would be closed to leasing.

Under Alternative D, the majority of BLM-managed areas that contain the 14 non-NSO leases would be closed to leasing. The area that remains open would not be near existing mineral operations so the leases would be unlikely to have any effects to minerals.

4.2.7 Impacts of Alternative E

Alternative E would allow leasing in Federal mineral estate outside of California DWR designated groundwater basins and sub-basins with 99,400 acres closed to leasing. This alternative provides less flexibility for oil and gas operators than Alternative A but more than Alternative B, Alternative C, and Alternative D. The open areas could experience exploration by up to 37 new wells and would have the same potential as Alternative A for creating mineral access restriction. Impacts to surface mineral deposits would be the same as described in Section 4.2.2 but could occur within a smaller area.

Mitigation

Mitigation Measure EM-1 would apply to Alternative E.

Leases Subject to Settlement Agreement1

The majority of the14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be open; however approximately 7,000 acres would be subject to NSO limiting the lease holder operations.

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 are located in areas near or within historic or recent mine areas. Consequently, implementation of Mitigation Measure EM-1 is required before granting the lease or included as a lease stipulation.

4.3 Geology

A wide range of potential impacts, including land subsidence, expansive soils, landslides and seismically induced landslides, and seismic hazards of surface fault rupture and strong ground shaking, were considered for the CCFO Planning Area and potential well drilling sites. Geologic formations, slope conditions, and proximity to active faults were considered by their potential to contribute to geologic hazards. Areas prone to risk for potential adverse impacts due to existing geologic, topographic, or soils conditions were identified and their relationship to proposed project components analyzed. Where existing conditions suggest a potential risk or impact, mitigation measures were identified to reduce the risk or impact.

4.3.1 Introduction

The 2007 RMP includes no specific geologic hazard management actions.

Assumptions

- The same level of oil and gas development under the 2015 RFD Scenario would apply to each alternative (i.e., 37 exploratory and development wells on 206 acres of disturbance).
- All surface-disturbing activities related to the 2015 RFD Scenario would likely occur on BLM-administered lands in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO Planning Area but could occur on any open lands throughout the CCFO Planning Area.
- Ancillary facilities for oil and gas production (e.g., pipelines, compressor stations, etc.) and downstream activities such as oil processing at refineries and natural gas transmission and distribution are separate activities that would not be substantially affected by the RFD Scenario, aside from the need to carry produced oil and gas to the existing transmission pipeline network over a distance that is likely to be less than 10 miles.

4.3.2 Impacts Common to All Alternatives

A geologic hazard impact is considered significant if people, property or the environment experience adverse effects or a loss. Typically earthquake ground shaking and fault rupture hazards are considered for structures where human occupancy occurs for extended periods of time (residence or work facilities). However, ground shaking or fault rupture within oil field areas that results in damage to an oil well (cement seals or casing failure), leaks of hazardous materials or chemicals, or ruptures of crude oil pipelines could also impact the environment. Although liquefaction potential and expansive soils are site-specific issues that may not affect many locations in the Planning Area, they should be evaluated before designing and constructing long-term storage tank facilities for oil or hazardous chemicals. Landslides could damage access roads and pipelines resulting in risk of injury or spills of chemicals or crude oil. The extraction of oil and gas, including the use of enhanced recovery practices, and groundwater can lead to land subsidence and a permanent reduction in aquifer storage (CCST, 2014). The amount of subsidence would depend on local conditions, including how much water is withdrawn and from where (CCST, 2014). One study of oil and gas fields in Houston found that oil and gas withdrawal was responsible for a very small portion of the total observed land subsidence (Holzer and Bluntzer, 1984). There are also many instances where enhanced recovery projects resulted in significant land deformation and subsidence (Taylor *et al.*, 2014). As described in Section 4.7 (Groundwater Resources), groundwater use for well stimulation treatments in the RFD Scenario is expected to be very small (up to 55 acre-feet per year). Consequently, the anticipated land subsidence impacts are minor. A more detailed analysis of potential impacts to aquifer storage and land subsidence would be required on a site-specific basis as appropriate.

The potential for induced seismicity due to hydraulic fracturing or fluid disposal in Class II injection wells as they are currently carried out is considered to be low (CCST, 2014). Stimulation activities applied

at the scale presently employed in other regions of the U.S. currently requires the disposal of much larger volumes of both flowback water from the stimulations themselves and produced water resulting from increased and expanded production, which could increase the hazard (CCST, 2014).

In March 2015, the BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands intended to reduce risks to resources and the environment. On June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule. The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). The following describes the effects of hydraulic fracturing on induced seismicity with and without implementation of the final rule.

The BLM hydraulic fracturing rule does not include specific provisions that address induced seismicity. As noted in the final rule, the research on the phenomena of induced seismicity from hydraulic fracturing operations is still ongoing and inconclusive. For hydraulic fracturing operations proposed in seismically active areas or when the BLM determines through the internal and public scoping process that seismic impacts are an issue, risks of induced seismicity would be evaluated through the NEPA analysis, including analysis of the proposed drilling and fracturing operations. The final regulations require submittal of additional geologic information prior to hydraulic fracturing to help further that review.

Under SB 4, hydraulic fracturing and fluid disposal are regulated by DOGGR through permit applications for well stimulation. Oil and gas developers would be required to comply with DOGGR's Well Stimulation Treatment Regulations, Section 1785.1, to monitor and cease hydraulic fracturing activities if an earthquake of Magnitude 2.7 or greater occurs within a radius of five times the fracture length from each point of fracture (DOC, 2015). These regulations include cessation of hydraulic fracturing within the specified radius until DOGGR has completed the evaluation of whether there is a causal relationship between the detected earthquake and the hydraulic fracturing. Regardless of whether the BLM hydraulic fracturing rule is upheld or overturned, the regulations under SB 4 would be implemented on BLM-administered land in California and would reduce potential effects of induced seismicity.

The CCFO has developed BMPs and SOPs related to geologic hazards and oil field development activities (Appendix D). These include:

- Civil engineering studies or geotechnical studies may be required to determine feasibility prior to road or other construction. Construction in areas of extremely unstable bedrock formations and active landslides will not be permitted or would require special design criteria.
- New wells and roads should be located in areas where cut and fill shall be minimized to the extent practicable.

4.3.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario while continuing current management under the existing 2007 HFO RMP. The potential effects of drilling up to 37 new oil and gas wells would include oil and gas well drilling or construction of access roads and pipelines near or across active faults, grading access roads and drill pads on potential unstable slopes or existing landslides, and construction of facilities on potentially liquefiable or expansive soils. Induced-seismic effects of hydraulic stimulation are the same as those described in Section 4.3.2.

Mitigation

GEO-1 **Avoid Active Fault Zones.** The applicant shall provide documentation to BLM that the location and trend of the proposed well will not be within or enter into and have adequate setback from an active Alquist-Priolo Earthquake Fault Zone, unless the applicant can show to BLM's satisfaction that the well drilling or stimulation treatment (including hydraulic fractur-

ing) will not be affected by rupture of a known fault, seismically induced ground shaking, and/or ground failure. The Application for Permit to Drill (APD) shall include a geologic report identifying Alquist-Priolo faults and proximity to access roads and drill pads.

GEO-2 **Prepare an Earthquake Response Plan.** For well sites located within 1.0 mile of an Alquist-Priolo Earthquake Fault Zone prepare and submit to the BLM for approval an Earthquake Response Plan outlining post-earthquake inspection and repair plans to evaluate any damage that has occurred. The plan shall include spill prevention, control and countermeasure plans to address hazardous materials associated with well drilling and well stimulation activities.

GEO-3 **Prepare a Geotechnical/Geologic Report.** As part of the APD for well drilling the applicant shall submit to BLM a geotechnical and geologic report addressing potential geologic hazards, including liquefaction and expansive soil risk, at new facilities, pipelines, or tank batteries. Landslide hazard areas and potentially unstable slopes shall be identified and evaluated for access roads and drill pads.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued and are located in areas with active faults, landslides and potentially unstable slopes, and potential expansive soils. Consequently, implementation of Mitigation Measures GEO-1, GEO-2, and GEO-3 are required before granting the lease or be included as a lease stipulation.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.3.4 Impacts of Alternative B

Alternative B would limit leasing to existing oil and gas fields defined by DOGGR with 754,000 acres closed to leasing. The open areas could experience exploration by up to 32 new wells and would have the same potential for expansive soils and landslides as Alternative A. Alternative B has three small open lease areas near active faults.

Mitigation

Mitigation Measures GEO-1, GEO-2, and GEO-3 would apply to Alternative B.

Leases Subject to Settlement Agreement

Under Alternative B, the majority of BLM-managed mineral estate that contain the 14 non-NSO leases would be closed to leasing. If new wells were drilled in the open areas over the next 15 years, they would have the same geologic hazard impacts and mitigation as Alternative A.

4.3.5 Impacts of Alternative C

Alternative C would limit leasing to high oil and gas potential areas with 394,400 acres closed to leasing. The open areas could experience exploration by up to 37 new wells and would have the same potential for geologic hazards as Alternative A.

Mitigation

Mitigation Measures GEO-1, GEO-2, and GEO-3 would apply to Alternative C.

Leases Subject to Settlement Agreement

The majority of the14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be in areas open under this alternative. If new wells were drilled in the open areas over the next 15 years, they would have the same geologic hazard impacts and mitigation as Alternative A.

4.3.6 Impacts of Alternative D

Alternative D would limit leasing to Federal mineral estate underlying BLM surface estate areas with 655,400 acres closed to leasing. The open areas could experience exploration by up to 37 new wells and would have the same potential for strong ground shaking, expansive soil, and landslide hazards as Alternative A. Alternative D includes very limited lease areas near the potentially active Rinconada fault.

Mitigation

Mitigation Measures GEO-2, and GEO-3 would apply to Alternative D.

Leases Subject to Settlement Agreement

Under Alternative D, the majority of BLM-managed mineral estate that contain the 14 non-NSO leases would be closed to leasing. If new wells were drilled in the open areas over the next 15 years, they would have the same geologic hazard impacts and mitigation as Alternative A.

4.3.7 Impacts of Alternative E

Alternative E would allow leasing in Federal mineral estate outside of California DWR designated groundwater basins and sub-basins with 99,400 acres closed to leasing. The open areas could experience exploration by up to 37 new wells and would have the same geologic hazard impacts as Alternative A.

Mitigation

Mitigation Measures GEO-1, GEO-2, and GEO-3 would apply to Alternative E.

Leases Subject to Settlement Agreement

The majority of the14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be in areas open under this alternative. If new wells were drilled in the open areas over the next 15 years, they would have the same geologic hazard impacts and mitigation as Alternative A.

4.4 Hazardous Materials and Public Safety

This section addresses the U.S. Bureau of Land Management's (BLM's) Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) for the proper management of hazardous materials to protect human health and the environment. This section also describes the types of potential impacts that Alternatives A through E could have related to hazardous materials on the environment and to public safety in the BLM Central Coast Field Office (CCFO) Planning Area. It addresses the types of mitigation that could be implemented to minimize impacts, where applicable.

4.4.1 Introduction

Approach to Impact Assessment

The Resource Management Plan Amendment (RMPA) alternatives would allow oil and gas development in identified areas of the BLM CCFO Planning Area. Oil and gas development involves extracting fluid minerals from the earth using various methods described in the Reasonably Foreseeable Development (RFD) Scenario (see Appendix B). The regional setting (see Section 3.4.3) and current conditions (see Section 3.4.4) reflect certain existing hazards of upset conditions associated with existing oil and gas production, well drilling, well stimulation treatments, transportation systems, and processing facilities.

The routine, non-routine, accidental, and upset conditions associated with oil and gas development potentially pose a risk to the environment and public health and safety. An upset is outside the expected normal operating conditions (e.g., loss of well containment during drilling, or piping leak during production, release of toxic gas such as hydrogen sulfide, etc.). The hazards of both routine and upset conditions of oil and gas development activities are considered in this analysis.

This analysis reviews possible risks associated with the exposure to hazards, the use of hazardous materials, and possible generation of hazardous wastes. The analysis describes the potential risk of upset and impacts to the environment and public and worker safety. Hazards include conditions that could potentially affect worker health and safety and possibly the nearby public at large. Examples include exposure to hazardous materials, such as naturally occurring substances (e.g., asbestos and/or heavy metals), chemicals or hazardous waste, or to physically hazardous situations, as may occur in areas of high wildfire potential or in proximity to unstable slopes or landslides.

Management Common to All Alternatives

Public health and safety is an aspect of the BLM management rather than an environmental component resource. Consequently, impacts to public health and safety are a direct result of the management actions in other resource programs. The discussion of the effects on public health and safety in each alternative would be limited to the effects in areas where hazardous materials could be present due to oil and gas exploration or development activities, access to areas in terms of response time to hazardous materials releases, and vehicle traffic.

The existing 2007 HFO RMP established the following objectives to achieve goals for hazardous materials and public safety management:

- Identify and control imminent hazards or threats to human health and/or the environment from hazardous substance release on public lands (e.g., abandoned mine lands (AML) sites).
- Reduce hazardous waste produced by BLM activities and from authorized uses of public lands through waste minimization programs that include recycling, reuse, substitution, and other innovative, safe, cost-effective methods of pollution prevention.
- Ensure that authorized activities on public lands comply with applicable Federal, State, and local laws, policies, guidance, and procedures.

- Promote working partnerships with states, counties, communities, other Federal agencies, and the private sector to prevent pollution and minimize hazardous waste on public lands.
- Protect visitors from risks associated with AMLs and former military lands having unexploded ordnance from either safety hazards and/or environmental releases of chemicals of concern.

The Hazardous Materials and Public Safety Management Actions from the 2007 HFO RMP include:

- **HAZ-COM1.** Maintain an inventory of hazardous materials sites, including abandoned mine sites, BLM facilities, and former military facilities (i.e., Fort Ord).
- **HAZ-COM2.** Ensure that all BLM-authorized activities comply with Federal, State, and local hazardous materials laws and regulations.
- **HAZ-COM3.** Reduce the use of Federal funds for clean-up of contaminated lands by seeking cost avoidance and/or cost recovery from the legally responsible parties.
- **HAZ-C1.** Evaluate existing trails and roads for sediment production and drainage in areas where naturally occurring asbestos (NOA) and heavy metals are likely to be present.
- **HAZ-C2.** Conduct air quality analyses to determine the presence and potential exposure to NOA during common activities in an area of potential concern.
- **HAZ-C3.** Where NOA is present at hazardous levels, post signs and/or inform users that NOA is present, what the risks are, and how users can avoid exposure.

By design, BLM BMPs, Oil and Gas SOPs, and Implementation Guidelines (Appendix D) are in place to reduce the potential for public safety impacts during oil and gas exploration and production by implementing measures that require hazardous materials to be stored in sealed containers, prompt response to cleanup, the standardized use of drip pans and secondary containment, and the proper containment and disposal of produced water and flowback fluids following well stimulation activities. The SOPs and Implementation Guidelines include Subsection 1.8.5, which describes BLM requirements for drilling new wells. While these SOPs have a particular focus on reducing environmental impacts, some of the requirements also reduce public health impacts and safety hazards due to the presence (or expected presence) of hazardous materials. The following are examples of those requirements:

- All liquids shall be in closed, covered containers. Any spills of hydrocarbon/hazardous substances shall not be left unattended until clean-up has been completed.
- A spill prevention plan must be submitted to BLM prior to project approval for new wells, well completion or work-overs, installation of new facilities (buildings, tanks, pipelines, production equipment, etc.), routine maintenance activities and well abandonments. The prevention plan must identify a Spill Response Team, comprised of State and Federal emergency response agencies and provides contact numbers for each representative or representative agency.
- Install plunger lifts and smart automation systems, which monitor well production parameters to reduce methane emissions from well blowdowns.
- Reduce fugitive gas leaks by implementing a Directed Inspection and Maintenance program, which identifies and effectively fixes fugitive gas leaks using leak detection (e.g., infrared camera(s), organic vapor analyzer(s), soap solution, and/or ultrasonic leak detector(s)) and measurement (e.g., calibrated bagging, rotameters, high volume samplers). Note: Fugitive emissions are often a precursor of larger leaks.
- Require that operators obtain and maintain as current all required State and Federal permits for the protection of groundwater and surface water quality. Additional measures to protect water resources that may be included as Conditions of Approval (COA) could be specifically designed and applied by BLM to protect groundwater include; zone isolation, general casing depth and cement requirements, pressure testing, casing integrity testing, fluid surveys, and/or wellhead monitoring.

- Design roads, well pads, and facilities for exploratory wells to impact and fragment the least acreage practicable. New facilities shall be designed to maintain natural drainage and runoff patterns. Non-commercial wells shall be restored as soon as appropriate using BLM restoration methods.
- Timely plugging and abandonment of depleted wells will be required. This includes plugging the well bore with cement, removing all materials and equipment, and recontouring/revegetation of well site as specified in the conditions of approval.
- Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the U.S. EPA Spill Prevention, Control, and Countermeasure regulation (40 CFR 112).
- The appropriate containment and/or diversionary structure would be sufficiently impervious to oil, glycol, produced water, or other fluid and would be installed so that any spill or leakage would not drain, infiltrate, or otherwise escape into the ground, surface, or navigable waters before clean-up is completed.
- Proper containment of oil and produced water in tanks, drilling fluids in reserve pits, and locating staging areas away from drainages would prevent potential contaminants from entering surface waters.
- Chemical containers should not be stored on bare ground or exposed to the sun and moisture. Labels must be readable. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture. All secondary containment must be designed to preclude entry from wildlife and livestock.
- Set and cement surface casings to sufficient depths to protect water bearing zones outside of the production zone(s).
- Consider the use of a closed loop drilling system. In the absence of a closed loop system, tanks and pits must be designed to preclude the entry of wildlife and livestock.
- Produced water from oil and gas operations would be disposed of in accordance with the requirements of Onshore Oil and Gas Order #7.
- Construction activities that disturb one or more acres of soil or less than 1 acre but are part of a larger common plan of development or sale having the potential to disturb one or more acres (includes clearing, grading, and ground disturbances such as stockpiling or excavation) are required to obtain coverage under the General Permit for Discharges of Stormwater Associated with Construction Activity (Construction General Permit, Order 2009-0009-DWQ) and manage construction in accordance with permit requirements.

Types of Impacts

Potential hazardous materials and public safety effects include the hazards associated with oil and gas exploration and production; risks associated with contact with produced fluids and well stimulation treatment chemicals; vehicular travel on county, the BLM- and operator-maintained roads; firearms accidents near oil and gas facilities during hunting season and by casual firearms use such as target shooting; and natural events such as range fires.

Areas with intensively developed oil fields that remain open to public access may result in the exposure of the public to a hazardous industrial environment including the dangers associated with hydrogen sulfide or methane gas and petroleum production. Active oil fields and active well sites are industrial areas where permissible public access would be carefully evaluated. In certain cases, access can be limited or restricted where active drilling, well stimulation, or other well workover activity is occurring.

This section considers the following types of hazards:

- A hazard to the public created through the routine transport, use, or disposal of hazardous materials.
- A hazard to the public created from changes in air quality, although concentrations of NOx, SOx, and/or ozone potentially above the National Ambient Air Quality Standards (NAAQS) (see Section 4.5, Air Quality).
- A hazard to the public created by increased vehicle traffic associated with oil and gas exploration and development including well stimulation activities.
- A hazard to the public created through conditions involving the increased risk of the release of hazardous materials (airborne and liquid spills).
- A hazard to the public created through conditions involving the increased risk of gas releases (toxicity/flammability).
- A hazard to the public created by intensively developed oil fields that remain open to public access may result in the exposure to a hazardous industrial environment (toxic or flammable materials).
- Fracturing-induced seismic events (see Section 4.3, Geology).
- Oil leaks from field gathering and intrastate crude pipelines.

Key attributes that affect the indicators are:

- Number of wells and related infrastructure;
- Acres where oil and gas exploration and development could occur; and
- Response time to hazardous materials incidents or vehicle accidents.

Assumptions

The analysis uses the following key assumptions:

- Hazardous materials and wastes are used and generated during oil and gas well development.
- With increased oil and gas exploration and development comes an inherent risk associated with an increase in the amount of hazardous materials used, generated, transported, and stored.
- While steam injection has been the primary enhanced oil recovery (EOR) technique applied to the fields, EOR and well stimulation treatments including hydraulic fracturing can be expected to be utilized.
- Oil and gas development may involve well stimulation treatments. For this analysis, hydraulic fracturing has been selected as the most likely well stimulation technology employed, since it involves the most logistics and potentially has the most health and safety impacts. Recent oil and gas activity in the CCFO Planning Area has involved only limited levels of well stimulation by hydraulic fracturing. In the Fresno County portion of the CCFO Planning Area, which has the highest level of well stimulation activity, 4 percent of recently producing wells indicate any record of previous hydraulic fracturing (see Appendix B, Table 2). No records of hydraulic fracturing were found for the Lynch Canyon and San Ardo fields.
- With the exception of San Ardo, the crudes from the CCFO Planning Area are considered sweet (<0.5% sulfur) or semi-sweet (<0.8% sulfur). Lacking information on the hydrogen sulfide concentrations in produced gas, we presume for the sweet crudes it is below the level where it poses a short-term acute health risk. A conservative value used for emergency response planning guidelines (ERPG) is 100 parts per million (ppm) for a 60 minute exposure or a dose of 6,000 ppm-min. For a 15 minute exposure, the concentration would be 400 ppm for the same dose. This analysis discusses the potential hazard, in the event the H_2S levels in produced gas may occur at higher levels (above 0.8% sulfur).

- Most of the exploration and production wastes generated during oil and gas exploration and development activities would be exempt from the Resource Conservation and Recovery Act (RCRA) hazardous waste regulations (e.g., produced water, produced oil, chemicals used for drilling and completion). Exempt waste material and debris from drilling would be classified as solid waste rather than hazardous materials because of the exemption for oil and gas exploration and development.
- Management of non-exempt hazardous materials, substances, and waste (including storage, transportation, and spills) would be conducted in compliance with 29 CFR 1910 (Occupational Safety and Health Standards), 49 CFR 100-185 (Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation), 40 CFR 100-400 (Protection of the Environment, EPA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Oil Pollution Act (OPA), RCRA, Toxic Substances Control Act, Clean Water Act, and other Federal and State regulations and policies regarding hazardous materials management.
- The BLM's Hazard Management and Resource Restoration Program would respond to accidental surface releases of hazardous material on the BLM-administered public land. Containment and emergency cleanup actions would be implemented on sites posing a threat to the public safety and/or the environment.
- BLM's oil and gas inspection and enforcement program aids in reducing the risks associated with negligent release of hazardous chemicals into the environment.
- The population would continue to increase, and there would be a corresponding increase of use of public lands.
- Promotion of the areas within the CCFO Planning Area as vacation and outdoor recreational destinations by the public would continue and could potentially result in an increasing number of visitors encountering hazards on public lands.
- Vehicle traffic would increase in proportion to oil and gas exploration and development.

4.4.2 Impacts Common to All Alternatives

The RFD Scenario (i.e., between zero and 37 development and exploratory wells with approximately 206 acres of surface disturbance over the next 15 to 20 years on Federal mineral estate in the Planning Area) would occur under all of the alternatives. The worst-case scenario (i.e., 37 wells and 206 acres of surface disturbance) may occur for each alternative herein. Therefore, any hazards and impacts related to gross well count (e.g., increased vehicle traffic, worker exposure, chemical use for well stimulation treatments) will be similar for all alternatives.

The oil and gas development would be as defined by the 2015 RFD Scenario (Appendix B). The well locations are non-specific, but some development would be expected on current leases near the existing Coalinga and San Ardo fields. The development is also expected to require up to 10 miles of new transmission pipeline to allow oil and gas production to be connected to existing oil and gas transportation systems. Under all alternatives, 37 new wells would be developed regardless of the range of options for closure of lands to oil and gas development.

Natural Hazards and Hazards of Oil and Gas Development

During well drilling, hazardous materials such as equipment maintenance fluids and fuels, oil, and hydraulic fluid would be used and stored at the well site and nearby staging areas. During hydraulic fracturing, acid well stimulation, or EOR — additional hazardous chemicals including acid and fluid additives would be expected to be located on the proposed project site (e.g., activator, biocide, breaker, and surfactant) (DOC, 2015). Spills and leaks of hazardous materials during well drilling, well stimulation, and maintenance activities could result in impacts to soil or groundwater.

In oil and gas operations, as with most industrial activities, the general public typically is either physically excluded or not permitted on the project site. This reduces the potential for the public to be exposed to specific site hazards. Leases for oil and gas development in the CCFO Planning Area are typically in remote areas, which would limit the number of unauthorized visitors, or fenced so as to prevent unauthorized access. Natural hazards related to wildland fire may also occur in the oil field sites.

For workers employed at an oil and gas field site, there is the potential to be exposed to hazardous materials. Hazardous materials are those materials considered to be toxic, corrosive, flammable, reactive, irritating, and strongly sensitizing. The use of such hazardous materials may pose a threat to human health and/or the environment through routine emissions and/or accidental releases.

Additional hazards are posed by operations. These include vehicle and equipment accidents, equipment noise, direct electrical hazards from power lines and generators, and exposure to chemicals in commonly used products such as gasoline, paint, and cleaning agents. Hazards may also occur due to fire, explosion, fugitive natural gas emissions, and improper storage of hazard materials and/or wastes.

At work sites, hazards are commonly identified and described in written and approved on-site health and safety plans that include appropriate emergency procedures, telephone numbers, routes to the nearest hospital emergency room or trauma center, and mitigation measures. Prior to project commencement, operators will require health and safety plans to be read, discussed, and signed by all on-site workers and supervisors.

For the purposes of this environmental analysis, hazards and hazardous materials associated with oil well drilling and well stimulation treatment are analyzed and discussed, independent of location. It is assumed that new well drilling and well stimulation treatment methodology and chemicals used would be similar across the CCFO Planning Area and similar to standard petroleum exploration and development practices in California.

Extraction of petroleum resources generally requires drilling of wells into the subsurface resources and basins to allow the oil and gas to flow to the surface by its own (using formation pressure) or in the case of oil from partially depleted fields, by pumping. Activities associated with oil and gas production include:

- Constructing well pads at the drill site
- Well drilling
- Well completion (e.g., perforation, cementing, stimulation, etc.)
- Commencing production
- Abandonment

Public Exposure to Hazards of Oil and Gas Operations

The mission of the BLM is to manage access to public lands for commercial and recreational interests. Areas with intensively developed oil fields that remain open to public access may result in the exposure of the public to a hazardous industrial environment including the dangers associated with hydrogen sulfide gas and petroleum production. As described in Section 3.4.3, the CCFO Planning Area is an area of heavy crude production that lacks substantial levels of natural gas production. Only one operator out of four in the Coalinga field reported any natural gas production in 2014 and for several years prior. Limited levels of gas production generally avoids the potential hazards of handling, processing, and transporting produced gas.

Oil and gas exploration and development are cyclical businesses, with periods of high and low levels of activities. Therefore, an operator may decide to temporarily "shut in" producing wells and wait for conditions to improve. The highly viscous nature of most heavy crude oil common in the CCFO Planning Area, typical low well head pressures, and the relatively low corrosive properties of the fluids (low sulfur crude) make the known dangers of shutting in a well for long periods and then bringing it back online less

of a mechanical problem in the CCFO Planning Area than in other producing regions of the country. Monitoring and supervising temporary abandonment of wells would be undertaken by DOGGR and BLM.

The following additional conditions may be required before the temporary abandonment of a producing oil and gas well, service well, or an injection well.

- **Zone Isolation.** The requirement to isolate the producing interval (General Requirement #4) is waived. This waiver is based on the information submitted with the application and the geologic data in *Volume II – California Oil and Gas Fields*, which may indicate the absence of usable water aquifers above the producing horizon.
- **Mechanical Integrity of Casing.** The mechanical integrity of the casing may be determined using a hydrostatic pressure test method.
- **Fluid Surveys.** In accordance with the requirements of the State of California Idle Well Program, a fluid level survey will be performed at two- to five-year intervals while the well is temporarily abandoned. A copy of the survey will be submitted to the BLM within five business days of the survey.
- **Monitoring of Wellhead Pressures and Temperatures.** Wellhead pressure and temperature will be continuously monitored while the well is temporarily abandoned. Any pressure/temperature change will be promptly reported to the BLM.
- **Isolation of the Producing Interval.** The producing interval shall be isolated by setting a plug in the casing within 100 feet above the producing interval if a rising fluid level, an increasing wellhead pressure, or an increasing wellhead temperature is detected. The plug could be either a retrievable or drillable-type bridge plug or a cement plug of at least 100 feet in length.

Closures of Oil and Gas Fields

As a further precaution, some public lands within existing oil and gas fields may be closed to public access. The rationale for the public closure of these intensively industrialized areas stems from a concern for public safety in these areas. Specifically, such areas could pose threats from exposure to, high temperature piping and equipment, hydrogen sulfide gas, natural gas, and crude oil. Complete public closure could be determined to be the appropriate management tool for the protection of human health and safety, if other options, such as requiring all publics to receive the specialized training needed to be in these areas and use the required equipment (H_2S monitors, fire retardant clothing, etc.) were deemed infeasible and unenforceable. Any such closures would be determined on a case-by-case basis accounting for the nature of the hazard and level of risk. In addition to existing fields, public access should also be restricted near active exploratory well drilling sites and wells undergoing stimulation or maintenance to further protect the public. This may require temporary road closure, signage, and developing alternative routes

Release of Hazardous Materials

Airborne Hazards

Well blowout is an accidental event that can occur during a well stimulation treatment and result in immediate hazards to workers and the public. Such an event may result in a release of oil and gas to the environment. In the event there is a gas release during a blowout, the gas may travel downwind into populated areas depending on the location of the field with respect to the populated area and the direction and strength of the prevailing wind. If the flammable gas cloud encounters an ignition source, a flash fire at the well head can occur and possibly ignite any volatiles left in the spill of crude oil. Flash fires have the potential to cause acute health risks to oilfield workers and possibly the public. In addition, if the release contains sour gas — a toxic hazard is associated with the blowout. The use of properly designed blowout preventers (BOP) limits the duration of blowouts and subsequent hazards so that the direct effects of the

blowout are generally limited. Well blowouts are relatively rare, or rarer than other events, such as casing failures and other construction-related defects providing the potential for directly relatable health risks.

There are many chemicals used during well stimulation treatments, including liquid acid mixtures and granular solids or sands for proppant. In combination, these chemicals and hydrocarbons can generate flammable mixtures that could under certain circumstances result in an explosion or fire if an ignition source were introduced. There have been a number of documented incidents where a blowout of a two phase stream of flammable gas/liquid resulted in the ignition of the resulting vapor cloud.

Blowout statistics for California oil and gas well drilling and production operations are collected by DOGGR. Four sources of blowout data were used for this study. DOGGR tracks surface well blowouts as a part of its mandate "to prevent, as far as possible, damage to life, health, property and natural resources" during "the drilling, operation, maintenance, and abandonment of wells" (PRC Section 3106). In response to this mandate, DOGGR generates three sources of data concerning blowouts (Jordan, 2008). DOGGR staff generates a published report using a standard form for each blowout. These data are typically entered into an electronic database. Additionally, DOGGR's "Annual Report of the Oil and Gas Supervisor" describes blowouts in the southern San Joaquin Valley region for study years between 1992–2006. In addition to data from DOGGR, staff at the Bakersfield Californian newspaper located all articles concerning blowouts during the 14-year study period: 32 blowouts were (uniquely) reported by only one source, 70 blowouts were reported by more than one source, and thus a total of 102 individual blowouts were identified.

Blowout statistics for the southern San Joaquin Valley (DOGGR District 4), as the largest hydrocarbon producing district in California, from 1991 to 2005, analyzed by Lawrence Berkeley National Laboratory (LBNL) for well drilling and work-over activities in non-thermal wells (Jordan, 2008), indicate the following:

- The frequency of blowouts during drilling or work-over is 0.0035/year per well or 1 in 28,000 wells for non-thermal wells.
- In the event of a blowout, 35 percent resulted in injuries and 15 percent resulted in environmental damage.
- Injuries ranged from sprains and abrasions to burns. No fatalities were cited for drill related blowouts, but one fatality was recorded by the overall data for drilling and operational well blowouts.
- Environmental damage consisted of various concentrations of oil covering 0.2 to 41 acres.
- No public impacts (as reported for Kern County) occurred during blowouts from these drilling activities; however, public impacts did occur from blowouts for the whole data set (thermal/non-thermal, drilling/operational wells) and ranged from loss of electricity, to road closures, to evacuation of homes and a school.
- The average duration of a drilling or work-over blowout was 10 hours.
- The statistics described here (Jordan, 2008) also showed a steady decline in the number of blowouts per year from 11 per year in the early 1990s to one in 2005, whereas the average blowout rate per well covers the total period. These data indicate that well blowouts during well drilling and completion in some instances pose a major hazard to service company employees, albeit at a relatively low rate of occurrence.

These statistics are for overall oil and gas operations during drilling and work over operations, which precede completions including well stimulation. They would be applicable to new wells drilled to benefit from well stimulation treatment.

The release of sour gas (containing hydrogen sulfide) during a blowout has the potential to produce the most severe effects due to the toxicity of the hydrogen sulfide. Closures of offsite public areas as a result blowouts may have been due to this specific hazard, since it has the most severe consequences in regards to human health and the difficulty related to containment. Most of the other hazards (e.g., fire, overpressure, oil contact) would be limited to the immediate vicinity of the damaged well. Operator emergency response planning documents should address public emergency evacuation situations (including those that may arise from blowouts) and procedures.

Per OSHA, hydrogen sulfide gas causes a wide range of health effects. Workers are primarily exposed to hydrogen sulfide by breathing it. The effects depend on the concentration of the hydrogen sulfide in atmosphere the individual is exposed to and the duration of the individual's exposure. Acute short-term exposure to very high concentrations can quickly lead to death (OSHA, 2005). A level of hydrogen sulfide gas at or above 100 ppm is Immediately Dangerous to Life and Health (IDLH) for a 30 minute exposure. At higher concentrations, hydrogen sulfide rapidly causes olfactory impairment. For most people, a concentration of 150 ppm is enough to immediately deaden the sense of smell. At a concentration of about 750 ppm or higher, inhalation of hydrogen sulfide gas can cause immediate collapse and unconsciousness.

Chronic long-term exposures can also result in health effects, and the threshold limit value for hydrogen sulfide is 5 ppm over 8 hours. Thus, workers in areas containing hydrogen sulfide must be monitored for signs of overexposure. Active monitoring for hydrogen sulfide gas and good planning and training programs for workers are the best ways to prevent injury and death. Thus, per API Recommended Practice 49, all drilling and/or servicing personnel should be trained in the potential dangers of hydrogen sulfide and precautions to be taken when it is encountered. Continuous hydrogen sulfide monitors/detectors should be available when drilling, workover or servicing a well with a potentially hazardous concentration of hydrogen sulfide. Protective breathing equipment shall be located so that it is quickly and easily available (API, 2001).

Proppant consists of small granular solids such as sands and ceramic beads. Sand is delivered via truck and then loaded into sand movers, where it is transferred via conveyer belt and blended with other hydraulic fracturing fluids prior to injection into the wellbore. Silica sand is often used as a proppant in most of the hydraulic fracturing operations. The National Institute for Occupational Safety and Health (NIOSH) identified exposure to airborne silica as a health hazard to workers conducting some hydraulic fracturing operations during recent field studies. In normal use, well stimulation liquid chemicals are transported and stored in U.S. DOT approved totes, and in general, spills are normally limited in size and do not pose a serious acute health risk from inhalation exposure; surface water contamination is discussed separately.

NIOSH and OSHA identify seven primary sources of silica dust exposure during hydraulic fracturing operations (OSHA, 2012):

- Dust discharged from thief hatches on top of the sand movers during refilling operations while the machines are running (hot loading).
- Dust discharged and pulsed through open side fill ports on the sand movers during refilling operations.
- Dust generated by on-site vehicle traffic.
- Dust released from the transfer belt under the sand movers.
- Dust created as sand drops into, or is agitated inside the blender hopper and on transfer belts.
- Dust released from operations of transfer belts between the sand mover and the blender; and
- Dust released from the top of the end of the sand transfer belt (dragon's tail) on sand movers.

Breathing silica could produce silicosis, which potentially leads to lung disease causing inflammation and reducing the lungs ability to take oxygen. Several OSHA standards and directives cover operations that may expose workers to silica, including:

- Air Contaminants (29 CFR 1910.1000)
- Hazard Communication (29 CFR 1910.1200)
- Respiratory Protection (29 CFR 1910.134)

OSHA's Directive CPL 03-00-007, titled National Emphasis Program – Crystalline Silica, has detailed information on silica hazards, guidelines for air sampling, guidance on calculating Permissible Exposure Limits (PELs) for dust containing silica, and other compliance information.

Valley Fever is also a potential hazard for oil and gas field workers. Cal/OSHA has taken action to protect workers in the oil and gas industry — as well as wild land firefighters, geologists, agricultural workers, and others engaged in earth-moving work or exposed to dusty conditions — from Valley Fever. Workers in the oil and gas extraction industry in California risk contracting Valley Fever, which is caused by a microscopic fungus that lives in the topmost 2 to 12 inches of soil. A person can get Valley Fever if he or she breathes in the fungus (*Coccidioides immitis*) that causes the disease. The fungus grows in the soil. It gets into the air when the ground is broken and the dirt and dust spread into the air. People with jobs that require digging in the soil have the greatest chance of getting Valley Fever. Drilling and other activities have the potential of disturbing the ground and releasing dust and fungal spores into the air.

OSHA's October 2013 fact sheet, "Advice to Employers and Employees Regarding Work-Related Valley Fever," outlined the causes of the potentially serious fungal infection and preventative measures while reminding employers to report cases of illness. Because there is no vaccination for Valley Fever, the fact sheet urged employers to take steps to protect their workforces, such as determining whether they work in an endemic area (mainly the Central Valley of California), adopting site plans to reduce exposure, protecting workers against exposure with NIOSH-approved respiratory protection filters, training workers on the risks of Valley Fever, and more. The Morbidity and Mortality Weekly Report from Centers for Disease Control and Prevention dated March 29, 2013, reports an average annual increase of 13 percent in the incidence of reported Valley Fever cases in California. While the fungus is consistently present in the soil of many undeveloped areas, highly endemic counties are Fresno, Kern, Kings, Madera, Merced, San Luis Obispo, and Tulare. The number of new Valley Fever cases reported in California has increased dramatically in the last few years, according to the California Department of Public Health, presenting a significant risk to public and worker safety.

Employers have a legal responsibility to report to Cal OSHA any serious injury or illness, or death, of an employee occurring in a place of employment or in connection with any employment.

Tips for reducing the risk of Valley Fever exposure include:

- Determine if a worksite is in an area where fungal spores are likely to be present.
- Adopt site plans and work practices that minimize the disturbance of soil and maximize ground cover.
- Use water, appropriate soil stabilizers, and/or re-vegetation to reduce airborne dust.
- Limit workers' exposure to outdoor dust in disease-endemic areas.
- When exposure to dust is unavoidable, provide approved respiratory protection to filter particles.
- Train supervisors and workers in how to recognize symptoms of Valley Fever and minimize exposure.

Surface Water Contamination

All phases of oil and gas development, including geophysical surveys, well pad grading, well drilling, or well stimulation, involve use of hazardous materials such as vehicle fuels, oil, hydraulic fluid, and other vehicle maintenance fluids that are routinely used and stored in staging areas and at worksites. Gasoline, diesel fuel, oil, hydraulic fluid, lubricants, paints, solvents, adhesives, and cleaning chemicals used in construction activities, equipment, and vehicles could potentially be released during well drilling and maintenance as a result of accidents, and/or leaking equipment or vehicles. Spills and leaks of hazardous materials during drilling and maintenance activities could potentially result in soil or groundwater contamination. Drilling muds are generally nonhazardous mixtures of water, bentonite and other drilling mud additives. However, heavy metals (mercury, cadmium, arsenic, and hydrocarbons) may mix with the drilling fluid and be temporarily contained in the mud pits and waste pits. Fluids used during well stimulation, including EOR and hydraulic fracturing, as well as the flowback fluids or produced water are known to contain low to moderate levels of contamination by hazardous substances. Wastewater is routinely injected for well stimulation or disposed of in deep formation injection wells.

An accidental release of a potentially harmful or hazardous material into a dry stream bed or wash would not be expected to directly affect water quality. Similarly, an accidental spill or release of hazardous materials outside of a stream channel would not be expected to directly affect water quality. However, accidental spills or releases of hazardous materials into a dry stream bed or wash, or on the banks of a stream channel, could indirectly impact water quality through runoff during a subsequent storm event, when the spilled material would be mobilized into a drainage or waterbody. Analysis of the potential for an accidental spill or leak of hazardous materials to affect water resources is presented in Section 4.8 (Surface Water Resources).

Accidental spills or releases of hazardous materials could potentially impact groundwater through direct percolation and/or advection following a rainfall event. Hazardous material spills that are left on the ground surface for an extended period or that are followed quickly by a storm event could leach through the soil and into the groundwater, thereby resulting in the degradation of groundwater quality. The potential for these effects to occur as a result of the alternatives are addressed in Section 4.7 (Groundwater Resources) and Section 4.8 (Surface Water Resources).

A Storm Water Pollution Prevention Plan (SWPPP) would be required for grading and ground disturbance activities exceeding 1 acre. The SWPPP should include a project-specific Spill Prevention Plan (SPP), which is required per CCFO BMPs and SOPs, covering grading for access roads and drill pads, well drilling, and well stimulation. Well field staging yards and storage tank batteries containing greater than 1,320 gallons will require a Spill Prevention, Control, and Countermeasure (SPCC) Plan. The SWPPP, SPP, combined with a SPCC Plan, as well as implementation of BMPs related to fueling and the handling, use, and storage of hazardous materials, and specific BMPs for well drilling and well stimulation, would mitigate accidental spills and leaks of hazardous materials. Preparation, approval prior to the start of site work (grading) or drilling, and compliance with such plans and BMPs would be included as part of each lease agreement in order to reduce the likelihood of spills.

In March 2015, the BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands intended to reduce risks to resources and the environment. On June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule. The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). The following describes potential risk of hydraulic fracturing to contaminate surface water with and without implementation of the BLM final rule.

All well stimulation projects subject to the BLM rule on hydraulic fracturing shall require preparation of spill control and emergency response plans to reduce the impacts of accidental spills and leaks. SB 4 (14 CCR Sections 1783.1 and 1786) also requires the operators to prepare a Spill Contingency Plan, which accounts for all fluids, addresses handling of well stimulation fluid and additives, and includes steps for spill response in the event of an unauthorized release. Section 1786 of the SB 4 Well Stimulation Treatment Regulations also requires that operators be in compliance with all applicable testing, inspection, and maintenance requirements for production facilities that are storing and handling well stimulation fluids. Therefore, if the BLM final rule is overturned, the effect regarding handling and spill response would be similar under SB 4.

Chemical additives used in well stimulation fluid consist of a blend of common chemicals that increase water viscosity, help extend the fracture, and suspend/transport the proppant and water mixture farther out into the fractures. Table 4.4-1 lists the typical fluids used in hydraulic fracturing. Generally no more than three to eight chemical products are present at one time at any given site, and unused products are removed from the site by the service company when the treatment is complete.

Table 4.4-1. Typical Hydraulic Fracturing Fluid Additives

Additive Type	Typical Main Compound	Purpose
Activator	EDTA/Copper Chelate	Agent used to degrade viscosity
Biocide	Propionamide	Prevents or limits growth of bacteria
Breaker	Sodium Persulfate	Agent used to degrade viscosity
	Ammonium Persulfate	
Crosslinker	Borate	Developing viscosity
Gel	Polysaccharide	Gelling agent for developing viscosity
	Naphtha hydrotreated heavy	
Clay Control	Potassium Chloride (KCl)	Clay-stabilization additive which helps prevent clay particles from migrating in water-sensitive formations
	Alkylated quaternary Chloride	
Acid/base (pH) Adjusting Agent	Acetic Acid	Adjusts pH to proper range for fluid
	Potassium Carbonate	
	Sodium Hydroxide	
Proppant	Silica	Holds open fracture to allow oil and gas to flow to well
Surfactant	Ethanol	Aids in recovery of water used during fracturing
Water	Water	Base fluid creates fractures and carries proppant, also can be present in some additives

Source: Halliburton, 2014.

Source: Halliburton, 2014.

The contamination of drinking water aquifers by well stimulation, especially hydraulic fracturing, continues to be a public concern. The contamination could potentially occur from subsurface or surface migration of fracturing fluids during and after well completion. The Clean Water Act authorizes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate the disposal of flowback fluids (following fracturing) into surface waters of the United States.

BLM final rule on hydraulic fracturing and the California SB 4 rules regulate the storage and containment of well stimulation treatment chemicals at the well site. The BLM final rule requires that recovered fluids (including flowback and produced water) be stored in rigid enclosed, above-ground tanks and cannot be stored in sumps or pits, with very limited exception. SB 4 regulations require that recovered fluids be stored in containers but does not specifically require that the containers be enclosed. It does not allow the fluids to be stored in sumps or pits. Therefore, both SB 4 and the BLM final rule require storage of flowback in containers. However, the BLM final rule is more stringent than the SB 4 regulations because it requires that the containers be enclosed. The potential for a surface release of flowback to occur is greater if the container is not enclosed, as is the potential for overfill due to rain water accumulation, wildlife to be trapped in the tanks, and the continuous venting of volatile compounds into the air.

Although the BLM final rule requires a closed container, which is a more protective container than required under SB 4, SB 4 requires secondary containment for any production facilities in place for 30 days or more and a Spill Contingency Plan to be implemented immediately in the event of an unauthorized release. Additionally, as with the final rule, SB 4 would not allow the recovered fluids to be stored in sumps or pits. These measures would reduce the likelihood of contamination of drinking water aquifers. Finally, SB 4 requires groundwater monitoring on a well-specific, field-wide, or regional basis and the groundwater plans are subject to review and approval by the SWRCB. Therefore, while it is unlikely that there would be contamination due to the storage of the recovered fluids, groundwater monitoring would ensure any contamination would be found and addressed.

Chemical Confidentiality. One of the recommendations of the U.S. Department of Energy, Secretary of Energy Advisory Board (SEAB) Shale Gas Subcommittee's report is to provide disclosure of fracturing fluid compositions. The lack of such information has contributed to the public concern regarding the public risks of wells stimulation techniques. Regulations under the BLM final rule on hydraulic fracturing (see 43 CFR Part Section 3162.3-3) and California SB 4 (14 CCR Section 1788) require, among other public disclosures, a complete list of the chemicals and the maximum concentration of each and every chemical constituent of the well stimulation fluids used, so that a complete health study can be conducted. The BLM final rule is more restrictive because it requires this public disclosure within 30 days, and SB 4 requires the public disclosure within 60 days, otherwise the requirements are substantially similar. If the BLM final rule were overturned, this disclosure would continue to occur in California under SB 4. Furthermore, operators are required to sample, analyze and submit the analysis to the DOGGR for all flowback fluid.

Temporary Storage. Under all alternatives, exploratory (wildcat) and field development drilling within the CCFO Planning Area during the next 15 to 20 years is estimated to reach 37 wells (Appendix B). Consequently, the temporary storage, handling, and use of hazardous materials within one of the active oil fields or adjacent areas where exploration is likely, is not anticipated to require exceptional levels of response to leaks or spills. Well stimulation activities would also require temporary storage and use of hazardous chemicals (principally acid). All well drilling, well stimulation and field production facilities (storage tanks, separation and treating areas) would be required to follow BLM Implementation Guidelines, or BMPs and SOPs, for chemical storage including placement on impervious surface, secondary containment, drip pans, labels on all containers, and covered/sun shield storage. CCFO BMPs and SOPs (in Appendix D) outline the requirements to keep drilling pits free of hydrocarbons and to properly remove and dispose of contaminated materials and substances during site reclamation, including closing the drilling pits, and this would help to prevent accidental release of or public exposure to chemicals.

Subsurface Contamination

Underground injection is the most common method of disposing of fluids or other substances from shale crude oil extraction operations. Disposal of flowback fluids and produced water via underground injection is regulated under the Safe Drinking Water Act's Underground Injection Control (UIC) program. Injection wells that may be used for disposal of flow back water and other produced waters are classified as Class IID in EPA's UIC program and require State or Federal permits. The primary objective of the UIC program, whether administered at the State or Federal level, is protection of underground sources of drinking water (USDWs). There are two areas of concern regarding subsurface contamination of aquifers by hydraulic fracturing fluids:

- Underground loss of well integrity at the depth of the aquifer, and
- Formation fractures extending vertically and reaching the bottom of the aquifer.

Well Integrity. The BLM's final rule regarding hydraulic fracturing requires best practice performance standards for well integrity testing, including cement return and pressure testing prior to drilling, as well as cement evaluation and remediation plans for surface casing that does not meet standards. The rule also eliminates the use of sample "type wells" for well integrity demonstrations, instead requiring best practices for all wells. Regulations under SB 4 (14 CCR Section 1784.1) also require similar well integrity testing such that if the BLM final rule were overturned, well integrity would still be confirmed. Additionally, regulations under SB 4 (14 CCR Section 1787) require monitoring of casing pressures after stimulation. According to Section 1784.1 of the regulations, the entire system has to be tested at 125 percent of the maximum surface pressure anticipated 30 minutes prior to stimulation, and a 24-hour notification is required so the State may witness the test. Additionally, the well owner/operator must perform a radial cement evaluation and the integrity of the casing will be monitored during stimulation (Section 1784.2).

The regulations specify the requirements for well casing cementing depths to protect or minimize damage to usable groundwater. Regulations under the BLM's final rule and SB 4 re-establish these requirements for well stimulation treatments and include additional requirements for cement quality and documentation. Both the BLM final rule and SB 4 require the applicant to demonstrate that all usable water and other mineral-bearing formations would be isolated and protected from contamination. Continuous monitoring of casing annuli pressure during stimulation, and frequent monitoring after treatment can detect potential integrity problems and allow implementation of corrective actions before severe contamination of usable groundwater occurs. Because SB 4 requirements for cement evaluation and testing are substantially similar to the BLM final rule, if the rule were overturned, risks of damage to usable groundwater would still be minimized under SB 4. Additional SB 4 regulations (Sections 1784, 1785, and 1787) require data submission and well monitoring during these steps of the stimulation program.

Fracture Penetration of Groundwater Zone. Another concern has been that fractures induced by well stimulation may grow vertically, if the stresses in the formation are such that vertical fractures are possible and where present in oil fields, could extend into the usable groundwater zone. However, fractures in the deep zones tend to be vertical due to overburden pressures, while fracturing in shallower zones tend to be in the horizontal direction. The occurrence of usable waters in oil and gas fields vary significantly and can often be found within hydrocarbon zones. In some cases, the physical distances involved between the fracturing depth and the shallow aquifers used for drinking water precludes interaction between the fractures and the fresh waters. See Section 4.7 (Groundwater Resources) for information on the risks of fractured formations and contaminants affecting the groundwater zone.

Well Water Testing. Engineering controls and administrative procedures reducing risk to usable groundwater aquifers are discussed in Section 4.7 (Groundwater Resources). Baseline water testing is a BMP that the BLM encourages. The BLM may require water testing and monitoring, especially if water quality impacts are a substantial concern based on local conditions and where the BLM or a cooperating landowner or manager manages the surface estate where testing could yield useful water quality information. In addition, the regulations under SB 4 (Section 1783.3) ensure the availability of water testing of wells to land owners with wells used for drinking or irrigation water. The cost of the testing is to be borne by the operator.

Irrigation with Produced Water

California is the third largest generator of produced water behind Texas and Wyoming (U.S. DOI, 2011). The U.S. Department of Energy, SEAB Shale Gas Subcommittee's report investigated the management and beneficial uses of produced water in Western states, including irrigation and livestock water use. The report provides information from the Food and Agriculture Organization on constituent limits for irrigation water. The limits were set from the perspective of health of plant growth only. The mechanisms for the constituent entering the food chain were not addressed. There may be an opportunity to supplement irrigation water use with produced water in California, but more information on the risks to human consumption of the irrigated food is needed (SEAB, 2011).

Pressurized Gas Releases

Modern drilling practices control well pressure to keep oil and natural gas from escaping into the environment. The primary ways to control subsurface pressure is by circulating weighted drilling fluid (drilling mud) down the drilled hole, and sealing off the rock layers with steel casing and cement.

All well drilling incorporate basic well control measures to drill safely and protect the subsurface and surface environment. Basic well control relies on weighted drilling fluids to balance the pressures encountered while drilling to maintain control of the well at all times. Drilling fluid weight must be balanced against formation pressures. The weight cannot be too heavy not too light. Heavy drilling fluid can exert too much pressure against the formation with the possibility of fracturing the zone, or too little pressure which leads to loss of

well control. Drilling fluid must be carefully balanced throughout the entire length of the well. Well control is furthermore enhanced with the required use of Blowout Prevention Equipment (BOPE) placed on the top of the well and provides protection against blowouts and includes the ability to circulate out a "kick," which is subsurface fluid in the well that effectively reduces the weight of the drilling fluid column. An operator drilling on Federal mineral estate must submit an APD containing all the information required by Onshore Order 1, including minimum specifications for BOPE that will be used to keep control of well pressures encountered while drilling. Onshore Order 2 identifies the minimum requirements for BOPE and the minimum standards for testing the equipment. Additionally, well BOPE requirements are covered under 14 CCR Section 1722.5.

Blowout preventer equipment systems are comprised of a combination of various components. The following components are required for operation under varying rig and well conditions:

- blowout preventers (BOPs);
- choke and kill lines;
- choke manifolds;
- control systems;
- auxiliary equipment.

The primary functions of these systems are to confine well fluids to the wellbore, provide means to add fluid to the wellbore, and allow controlled volumes to be removed from the wellbore. These series of large valves and other devices installed on top of the well, allow drillers to manage pressure increases or close the well, if necessary. By closing and opening the appropriate valve or series of valves, the drillers can re-establish control of the well and adjust the drilling fluid weight to account for the increased pressure. Because BOPs are critical to the safety of the crew, the rig, and the well, they are inspected, tested, and refurbished at regular intervals. Due to the extensive development of some oil and gas reservoirs in the CCFO Planning Area, well pressures have declined in many locations.

Truck and Passenger Transportation

Vehicle traffic would increase in proportion to oil and gas exploration and development, although the incremental change under the RFD Scenario would be small. Routine oil and gas production throughout the CCFO Planning Area involves a baseline of activity (see Section 4.18, Transportation and Access). New well development and well stimulation treatments add truck and passenger traffic to California roads that increases hazards to the public either through vehicle movements or transportation of hazardous materials.

An example of the equipment used and level of activity during hydraulic fracturing activities appears in Table 4.4-2 below.

Table 4.4-2. Typical Equipment Used for Hydraulic Fracturing Activities

Equipment	Activity	Number	Duration of Use (days)
Control van	Fluid quality and data monitoring*	2	1 or 2
Pump truck	Pumping	4	1 or 2
Flatbed	Chemical storage (holds approximately 10 tote tanks)	1	1 or 2
Manifold/treating iron trailer	Hauls pipes	1	1 or 2
Tanker/mixer (5,000 gallon)	Gel storage and hydration unit	1	1 or 2
Blender	Blend fluid and proppant	1	1 or 2
Crane	Lifting heavy equipment	1	1 or 2
Sand chief (150 ton capacity)	Sand storage	1 to 4	5 to 7 days

Table 4.4-2. Typical Equipment Used for Hydraulic Fracturing Activities

Equipment	Activity	Number	Duration of Use (days)
Pickup truck or van	People/tools transport	2	1 or 2
Water tanks (500 barrel laydown tanks or 400 barrel upright tanks)	Water storage	8 to 15	5 to 7 days
Water trucks (4,000 or 5,000 gallon) (if not available via pipeline)	Supplies water	~50 to 63 round trips**	Prior to hydraulic fracturing activities
Sand trucks (25 ton capacity)	Hauls sand	8 to 20 round trips	Prior to hydraulic fracturing activities

Source: DOGGR, 2014; Halliburton, 2014; Schlumberger, 2014; Baker Hughes, 2014.

* Workers in the monitoring van include individual personnel responsible for: (1) status of equipment; (2) monitoring blending; (3) engineering; (4) quality control of the fluid being pumped; and (5) observation (from the operator company).

** Approximately 5 to 10 million gallons of water is typically required for both exploratory drilling and hydraulic fracturing stimulation of the Monterey Formation, which would result in 1,000 to 2,000 round-trip truck trips to deliver water to the site.

To estimate the number of trucks required for proppant deliveries, the number of rail cars was first developed. For each well between 200-500 tons of proppant is delivered by rail, and all proppant rail deliveries are assumed to be into Bakersfield. 300 tons of proppant was assumed, which is the equivalent of three rail cars per well based on 100 tons per rail car. The proppant is delivered to the wells in 25-ton trucks, which results in 12 trucks for each well. An average distance was selected for each region depending on the location of the well fields from Bakersfield. The distances from Bakersfield to the well fields were determined by estimating the mileage on State or interstate highways. Table 4.4-3 shows the total maximum number of roundtrips and roundtrip miles by county and field as a proxy for possible well locations.

Table 4.4-3. Annual Proppant Deliveries and Roundtrip Miles

County / Field[1]	Stimulation Wells per Year	Roundtrip Miles from Bakersfield[2]	Roundtrips per year[3]	Roundtrip Miles per Year
Fresno / Coalinga	1	225	12	2700
Fresno / Jacalitos	<<1	225	0	nil
Fresno all traffic	1	225	12	2700
Monterey / Lynch Canyon	<<1	300	0	nil
Monterey / San Ardo	1	300	12	3600
Monterey all traffic	1	300	12	3600
Total	**2**	—	**24**	**6300**

1 - Fresno and Monterey Counties are anticipated to have hydraulically fractured wells.
2 - Distance from Bakersfield to the average location of well fields in region.
3 - Assumes 12 truck deliveries of proppant per well.

The well stimulation truck deliveries include stimulation water, water tanks, chemical additives, sand chiefs, and pumps/mixers. Trucks to haul solid waste are also needed. Two chemical flatbeds, two waste trucks, and four auxiliary trucks for equipment such as pumps and mixers were assumed per well. The roundtrips for water were 63 for both existing and new hydraulically fractured wells, shown in Table 4.4-2. The roundtrip miles for all categories except proppant were assumed at 50 miles per roundtrip at the region level. At the field level, the roundtrip miles were 10 miles for trips within the fields, based on an average field size.

The maximum number of roundtrips and roundtrip miles for stimulation water, chemical flatbeds, waste, and auxiliary equipment (pumps and mixers) is shown in Table 4.4-4. The largest number of roundtrips is for water, which as a conservative assumption, was assumed to be completely delivered by truck.

Table 4.4-4. Annual Number of Trips and Roundtrip Miles for Chemicals, Waste, Stimulation Water and Auxiliary Equipment

County / Field[1]	Stimulation Wells per Year	Water Truck Roundtrips[2]	Water Truck Roundtrip Miles[3]	Chemical Flatbed and Waste Roundtrips[4]	Chemical Flatbed and Waste Roundtrip Miles[3]	Auxiliary Truck Roundtrips[5]	Auxiliary Truck Roundtrip Miles[3]
Fresno / Coalinga	1	63	3,700	4	240	2	240
Fresno all traffic	1	63	3,700	4	240	2	240
Monterey / San Ardo	1	63	3,780[6]	4	240[6]	4	240[6]
Monterey all traffic	1	63	3780	4	240	4	240
Total	**2**	**126**	**7,560**	**8**	**480**	**8**	**480**

1 - Well stimulation treatments are expected in Fresno and Monterey Counties.
2 - Assumes 63 round trips based on Table 4.4-2.
3 - Assumes 50 miles roundtrip, except for fields.
4 - Assumes two chemical trucks and two waste trucks per well.
5 - Assumes four auxiliary trucks for pumps, mixers, blenders and crane per well.
6 - Roundtrip miles within these oil fields. Roundtrip miles for all oil and gas fields assumed at 10 miles based on the average field size.

Table 4.4-5 shows the maximum annual number of trips and roundtrip miles for workers, as well as trucks for sand chiefs and water storage tanks. The well stimulation activities were assumed at 7 days to estimate the roundtrips for workers. Fifteen roundtrips per day were assumed for the workers, and additional personnel such as the owner/operator were assumed at five roundtrips per day. Roundtrip miles for workers were assumed at 50 miles roundtrip. Four sand chiefs and 15 water tanks were assumed per well, and at 50 miles per roundtrip. The overall number of incremental roundtrips and miles traveled per year per county, as shown in Tables 4.4-3 through 4-4-5, would not represent a major increase over the level of activity in the setting.

Table 4.4-5. Annual Number of Trips and Roundtrip Miles for Well Workers, Water Tanks, and Sand Chiefs

Study County[1]	Stimulation Wells per Year	Roundtrips for Workers[2]	Roundtrip Miles for Workers[3]	Water Tank Truck Roundtrips[4]	Water Tank Truck Roundtrip Miles[3]	Sand Chief Truck Roundtrips[5]	Sand Chief Truck Roundtrip Miles[3]
Fresno / Coalinga	1	140	7,000	15	750	4	200
Fresno all traffic	1	140	7,000	15	750	4	200
Monterey / San Ardo	1	140	7,000	15	750	4	200
Monterey all traffic	1	140	7,000	15	750	4	200
Total	**2**	**280**	**14,000**	**30**	**1500**	**8**	**400**

1 - Well stimulation is expected in Fresno and Monterey Counties.
2 --The number of trips per day was assumed at 20 and well operations were assumed at 7 days.
3 - Roundtrip miles were assumed at 50 miles, except for fields.
4 - Assumes 15 water tanks per well.
5 - Assumes 4 sand chiefs per well.

Table 4.4-6 summarizes the annual mileage for WST activities based on two completions per year for all counties. The average mileage per trip is approximately 64 miles based on the total vehicle round trips from Tables 4.4-3 thru 4.4-5.

Transportation of Crude Oil and Gas by Pipeline

The California State Fire Marshal's Hazardous Liquid Pipeline Risk Assessment report (CSFM, 1993) indicates that over a 10-year period (1981-1990) there were no injuries or fatalities associated with crude oil pipeline spills in California; no fatalities occurred with the recent crude oil spill due to a pipeline leak in Santa Barbara (May 19, 2015).

Failure of crude oil and produced gas pipelines results in an impact zone that is primarily a function of the pipeline operating pressure and the hydrogen sulfide content, rather than the throughput, with the effects minimized by safety features and activities conducted in response. The frequency of a release (leak or rupture) is primarily a function of the construction of the pipeline, the inspection and maintenance, operational practices, as well as third-party damage. The volume of the subsequent release is a function of the training of the operators as well as the design, construction and maintenance of the leak detection system. Pipeline leaks are most commonly a result of corrosion/erosion, or third-party intrusion (e.g., San Bruno and San Bernardino incidents) to the pipeline. It should be noted that current technology cannot detect small pin-hole leaks in pipelines, which can be the source of long-term releases going undetected especially related to buried pipelines.

Table 4.4-6. Annual Mileage for WST Completions

Vehicle use	Miles
Proppant	6,300
Stimulate water	7,560
Chemicals	480
Auxiliaries	480
Water tanks	1,500
Sand chiefs	400
Workers	14,000
Total	30,720

The RFD Scenario (in Section 5.3 of Appendix B) projects that 10 miles of new transmission pipelines could be constructed in the study period. The report does not specify whether the connecting pipelines would carry oil or gas. A produced gas pipeline is potentially more hazardous to the public due to its flammable and possibly toxic (hydrogen sulfide) characteristics. As discussed with the Assumptions, the hydrogen sulfide concentration for some produced gas in the CCFO Planning Area may be sufficiently low so as to not pose an acute health risk to the public.

Unconfined vapor cloud explosion (UVCE) and flash fire are potential hazards of produced gas. The occurrence of an UVCE depends on the amount of natural gas liquids (NGLs) in the gas. An UVCE is not likely if the NGL concentration is under 10 percent and there is not confinement. The flash fire hazard is present when the gas release does not immediately ignite and a flammable gas cloud spreads and ultimately ignites. The thermal radiation from a flash fire is intense for someone nearby and can cause serious burns and potentially a fatality.

The total length of the expected new pipelines is relatively short, which reduces the potential for a loss of integrity scenario. Also, thermal recovery wells (generally required in the CCFO Planning Area) have little associated gas, so it is more probable that the new pipelines will be for crude oil transfer. As discussed above, the BLM may consider limiting public access to some areas within the leases that are considered higher risk, such as piping handling sour gas.

Other Risks and Hazards

There could be health effects associated with air emissions from project-related vehicles, firearm accidents, natural disasters and fugitive dust from roads and from the application of dust control treatments. Fugitive dust could reduce other visibility in localized areas and could increase the potential for vehicle accidents in the Planning Area.

The potential for firearms-related accidents would be expected to occur primarily during hunting season. The increased activity during drilling and field development would be likely to discourage hunting in the immediate vicinity of oil and gas exploration and development during that period. Consequently, the risk of firearms-related accidents should be minimal. During project operations, the relatively few personnel on-site would experience only highly localized risk of firearms-related accidents from recreational target shooting or hunting activities.

Under any alternative, future oil leases located within Fort Hunter Liggett will require Conditions of Approval or stipulations that all ground disturbance areas (access roads and drill pads) shall be screened and, if necessary, cleared of munitions and explosives of concern.

The risk of wildland fires could increase in areas associated with oil and gas construction activities, due to vehicle collisions, industrial development, and the presence of fuels, storage tanks, natural gas pipelines, and gas production equipment. Fire suppression equipment, fencing and netting of pits, a no-smoking policy, shutdown devices, and other safety measures typically incorporated into gas drilling and production activities would reduce the risk to public health and safety. There could be an increased risk of wildland fires ignition where construction activities place welding and other equipment in or near vegetation. Adherence to relevant safety regulations by operators and enforcement by the respective agencies would reduce the probability of wildland fires ignitions.

Both workers and the public could be exposed to naturally occurring hazardous materials that are found in the soil throughout the CCFO Planning Area, such as asbestos found in serpentine soils and mercury, chromium, and other heavy metals found in soils surrounding past mining operations (BLM, 2013). These materials also can be found at a distance from past mining operations because some of these naturally occurring hazardous materials have been eroded and transported via stormwater runoff to downstream depositional areas (BLM, 2013). Oil and gas production activities would result in soil disturbance and could mobilize these naturally occurring hazardous materials. Workers and the public potentially could be exposed to these mobilized hazardous materials either through direct contact or through inhalation of airborne particles.

4.4.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario while continuing current management under the existing 2007 HFO RMP (BLM, 2007).

Release of Hazardous Materials

Drilling, field development and production activities associated with oil and gas exploration and development require use of a variety of chemicals and other materials, some of which would be classified as hazardous, including drilling muds and additives for completion and EOR and hydraulic fracturing activities. These fluids could contain various contaminants such as salts, acids, mercury, cadmium, arsenic, and hydrocarbons, among others, which, if not managed correctly, could leach into soil and directly impact groundwater quality by down-hole releases. The runoff of contaminants into surface water could potentially impact surface water and/or groundwater quality. Potential impacts associated with hazardous materials include human contact, inhalation or ingestion and the effects of exposure, spills, or accidental fires on soils, surface and groundwater resources, and wildlife. Operators of well stimulation treatments would be required to file information to BLM that is required by the BLM final rule, if upheld, and to DOGGR that is required by SB 4.

Development in ROWs (e.g., along road shoulders) and in designated corridors could affect public health and safety by inadvertently providing access to areas that could contain hazardous materials or authorizing surface-disturbing activity near these areas. Public health and safety would continue to be protected because site-specific authorizations or designations would not be issued in areas that would jeopardize remediation activities.

Soil or groundwater contamination could result from accidental spill or release of hazardous materials during oil and gas exploration and development, facility operations or during maintenance of the pipelines and other utilities. Spills or releases could result in contamination to soil and/or groundwater and exposure of maintenance workers and the public to hazardous materials. In the event of a hazardous materials release, BMPs (Appendix D) would reduce the potential for contamination and exposure of workers or the public to hazardous materials.

In general, the population centers in the foreseeable development areas are not intermingled with the oil and gas properties. The towns of San Ardo and Bradly in Monterey County are a respectable distance from the producing areas. The petroleum fields are closer in the case of Coalinga in Fresno County, but in the absence of significant gas production, the effect would still be minor.

The risk of human contact with hazardous materials would be limited predominantly to operators and contractor employees. A Hazard Communication Program, Spill Prevention Control and Countermeasures Plans, and other mitigation measures would reduce the risk of human contact, spills, and accidental fires, and provide protocols and employee training to deal with these events should they occur (Appendix D).

Managing some acreage of the BLM-administered mineral estate as closed to oil and gas exploration and development would reduce occupational hazards, exposure to hazardous materials and vehicle traffic associated with oil and gas exploration and development in these areas. In addition, the potential for hazardous material exposure would be reduced or eliminated in areas managed with No Surface Occupancy (NSO) stipulations. Please see Chapter 2, Section 2.5.1, for a description of lease stipulations, including the NSO stipulation.

Hazardous material impacts would be avoided or reduced by the implementation of the BMPs outlined in Appendix D. Federal and State operating and reporting requirements (e.g., BLM's final rule on hydraulic fracturing) include provisions to clean up and mitigate spills or releases of chemicals, products, or wastes. The BLM policy requires identification of the chemicals that would be used, stored, and produced during construction and operations. Hazardous Substances Management Plans would be developed and implemented by the oil and gas companies to prevent spills and illegal dumping of hazardous substances, pesticides, and wastes. It is assumed that the storage, use, and transport of these materials and the disposal of generated wastes would comply with all pertinent Federal regulations. BLM SOPs and DOGGR regulations include well abandonment practices to mitigate loss of containment of depleted wells.

Reclamation of areas disturbed by oil and gas exploration and development would reduce erosion, stabilize sites and improve vegetation cover. Reclamation would reduce exposure and movement of contaminated soils. Reclamation activities could also restore watershed function and indirectly help maintain water quality and reduce effects to public health.

Transportation by Pipeline

In areas containing surface or near-surface pipelines, individuals could be exposed to hazardous materials if there were a leak or a failure. The risk of leak or failure could be higher in the vicinity of road crossings or areas likely to be disturbed by road maintenance activities. Compliance with signing requirements for pipeline ROWs and posting markers at frequent intervals along the pipelines would reduce the likelihood of pipeline ruptures caused by third party excavation equipment. The remoteness of many projects and the low level of anticipated non-project-related construction and excavation would reduce the risk to public health and safety. Routine monitoring would reduce the probability of effects to health and safety from ruptures by facilitating the prompt detection of leaks.

Managing areas as closed to oil and gas exploration and development or with NSO stipulations could shift the location of pipelines and other utilities to other areas. This could concentrate the placement of pipelines and utilities and increase the risk of hazardous materials exposure in concentrated areas. Concentrating the placement of oil and gas activities and development also could decrease the emergency response time and leak detection time, and could reduce the number or size of hazardous material releases if co-location results in additional personnel inspecting and reviewing pipelines and utilities or more quickly becoming aware of leaks, spills, releases, or emergencies.

The RFD Scenario considers the addition of 10 miles of new interconnecting pipelines, which will most likely be located in existing ROWs (e.g., along road shoulders) to minimize surface land disruption. As indicated above, such pipelines (including road crossing) could expose the public to contacting hazardous material releases, including hydrogen sulfide in the case of a sour gas line.

Occupational Hazards

Health and safety impacts to operators, contract workers, and other public land users could result from industrial accidents. Increased oil and gas exploration and development would result in an increased potential for accidental releases and/or worker incidents. Drilling operation plans approved by the BLM would address the potential for the accidental release of hazardous materials. Adherence to relevant safety regulations by oil and gas operators and enforcement by the respective agencies would reduce the probability of accidents

The estimated oil and gas round trip traffic volume from well pad exploration and development is presented in Tables 4.4-4 and 4.4-5. The traffic volume from oil and gas vehicles on resource roads, local roads, collector roads, county road and State highways could increase the potential for accidents on roads with both public and oil- and gas-related motor vehicle traffic. Reducing fugitive dust on these roads would help maintain visibility for drivers and could indirectly reduce the potential for vehicle accidents in localized areas. The estimated vehicle round trips per well pad during construction and production would range from 0, when no oil and gas activity is occurring, to 795 round trips per well for drilling and completion of a well pad (BLM, 2015, pg. 4-598). Considering WST as a type of completion activity, WST activities could add another 172 round trips assuming some worker miles are already accounted for in the construction/production trips. Assuming approximately two new wells per year, the average annual total round trips for both counties is slightly more than 1,935 per year. Using an average of 64 miles per trip (estimated from Table 4.4-6), this gives a total of 2.29 million miles for the total life of the RFD Scenario.

The 2010 through 2012 average accident rate from the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) for Fact Sheet Heavy Trucks was used (NHTSA, 2014). Since accident data for light trucks was not located, and since light trucks were a relatively small amount of the truck traffic, its rate was assumed to be similar to heavy trucks.

Since the accident rate is given as 24 accidents per 100 million miles, there was only enough traffic in the alternatives to have a fraction of one accident for all counties. Spread over two or more counties, the accident rate is negligible over the life of the plan. Using the truck accident rate, there was not enough estimated vehicle mileage to forecast an accident for any of the alternatives during the life of the RFD Scenario.

Impacts Mitigated by Stipulations and Recent Regulations

The acreage open in Alternative A for oil and gas development would not be specifically subject to BLM CSU stipulations that apply for all other alternatives. The primary CSU stipulation applicable to this assessment of public impacts is CSU-Well Stimulation Treatment contained in Appendix C. Alternative A utilizes the existing 2007 HFO RMP to ensure that authorized activities on public lands comply with applicable Federal, State, and local laws, policies, guidance, and procedures. Hence, while BLM CSU stipulations are not specifically applied, DOGGR regulations regarding well stimulation treatments would be invoked, which would have the same effect as the CSU stipulation for well stimulation treatment.

Given the following attributes, minor impacts would be likely due to the:

- low level of foreseeable oil and gas development per RFD Scenario;
- generally heavy, sweet crude characteristics with limited produced gas;
- low population densities around BLM acreage; and
- 2007 BLM HFO RMP practices and Federal and State regulatory requirements.

Mitigation

Mitigation Measures PS-1 through PS-6 include the types of measures that could be implemented to lessen the degree of potential adverse public safety impacts from development of oil and gas leases under

Alternative A. During review of whether to accept or deny project proposals, BLM managers can decide to attach additional stipulations or measures, such as the following, to minimize or avoid potential health and safety effects.

PS-1 **Prepare and Submit SWPPP and SPP.** A Storm Water Pollution Prevention Plan (SWPPP) would be required for grading and ground disturbance activities exceeding 1 acre. The SWPPP should include a project-specific Spill Prevention Plan (SPP, per CCFO BMPs and SOPs) covering grading for access roads and drill pads, well drilling, and well stimulation.

PS-2 **Prepare and Submit SPCC Plan.** Well field staging yards and storage tank batteries containing greater than 1,320 gallons will require a Spill Prevention, Control, and Countermeasures (SPCC) Plan.

PS-3 **Pipeline Safety.** New interconnecting pipeline should be design to allow passage of internal inspection tools (smart pigs) to detect internal and external anomalies.

PS-4 **High Consequence Areas.** Remotely operated isolation valves should be provided for any designated High Consequence Areas (HCAs) defined per USDOT PHMSA criteria.

PS-5 **Hydrogen Sulfide and Flammable Gas Hazards.** For High Consequence Areas (HCAs) resulting from produced gas hazards, H_2S and/or flammable gas detection should be considered to protect the public. In addition to the normal transmission pipeline ROW warning posts, signage indicating a hydrogen sulfide hazard should be posted where public access is allowed.

PS-6 **Pipeline Integrity.** Crash barriers should be provided along roads where pipelines are exposed.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued. These leases are located in a historically nonproductive wildcat area west of San Ardo field (DOGGR, 2007) and in or near the Vallecitos oil field. Well drilling and other field development activities in these leases or new facilities in the Vallecitos field may occur. Although these leases either have not been granted or have been suspended, it is possible that some or all of the 37 exploratory or development wells could be drilled on these leases in the future.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.4.4 Impacts of Alternative B

This alternative is the most restrictive of all the alternatives for closures of some Federal mineral estate to oil and gas leasing and development. The acreage open to oil and gas leasing and development is reduced from 683,800 acres of a little less than 39,000 areas. This elimination of available acreage would result in co-location of oil and gas activities and facilities into a much smaller area. The effect would be to concentrate the risk of hazards impacting the public to specific localities. This would tend to confine the impacts to the public due to upset conditions to areas of existing oil and gas production and active fields. The open areas could experience development by up to 32 new wells and would have the same potential for hazardous material releases as Alternative A. However, the expected emergency response times should be shortest (best) in this alternative due to the relative co-location of oil and gas activities. This could lead to more NSO stipulations or closures of land to the public.

Alternatives B thru E, when compared with Alternative A, would include more areas for closures or areas with NSO stipulations. The greater areas of closures could result in the concentration of oil and gas exploration and development activities in areas managed with standard lease terms and conditions and CSU stipulations. As such, the potential for hazardous material exposure in localized areas could increase marginally under Alternatives B thru E compared with Alternative A, depending on the options for closing Federal mineral estate to development.

Alternatives B thru E would include CSU stipulations on Federal mineral estate open to leasing. Stipulation CSU-WST (Appendix C) requires operators meet BLM data requirements by providing it with information required by California State Senate Bill 4 (SB 4). Applicable SB 4 information includes, but is not limited to, the permit application, Water Management Plan, Water Monitoring Plan, and, if available, the State-approved SB 4 permit.

The other impacts and mitigations are expected to be the same as for Alternative A.

Mitigation

Mitigation Measures PS-1 through PS-6 at the end of Section 4.4.3 include the types of measures that could be implemented to lessen the degree of potential adverse public safety impacts from oil and gas leases associated with Alternative B.

Leases Subject to Settlement Agreement

The 14 non-NSO leases would not be likely to experience the full scope of the RFD Scenarios. However, the hazardous material and public safety impacts and mitigation are the same as Alternative A.

4.4.5 Impacts of Alternative C

Alternative C strikes a balance between land open (368,800 acres of high oil and gas occurrence potential), and closed (394,400 acres of moderate to low potential) to oil and gas leasing and development. This alternative also has almost 30,000 acres of open acreage with a NSO stipulation. The open areas could experience development by up to 37 new wells and would have the same potential for hazardous material releases as Alternative A. Under certain local geological circumstances, any oil and gas resources on this acreage might be accessed by directional drilling for leases without NSO stipulations. The open areas would have CSU stipulations. The impacts to the public due to upset conditions are not expected to be significantly different from Alternative A.

Mitigation

Mitigation Measures PS-1 through PS-6 at the end of Section 4.4.3 include the types of measures that could be implemented to lessen the degree of potential adverse public safety impacts from oil and gas leases associated with Alternative C.

Leases Subject to Settlement Agreement

The 14 non-NSO leases would not be likely to experience the full scope of the RFD Scenarios. However, the hazardous material and public safety impacts and mitigation are the same as Alternative A.

4.4.6 Impacts of Alternative D

Alternative D is similar to Alternative B with a large portion of the acreage (655,400 acres) being closed to oil and gas leasing and development. Being less restrictive, Alternative D would be beneficial as there would be less concentration of oil and gas activities to a relatively small percentage of the CCFO Planning Area acreage. This alternative also has 16,400 NSO acres. The open areas could experience development by up to 37 new wells and would have the same potential for hazardous material releases as Alternative A. The impacts to the public due to upset conditions are not expected to be significantly different from Alternative A.

Mitigation

Mitigation Measures PS-1 through PS-6 at the end of Section 4.4.3 include the types of measures that could be implemented to lessen the degree of potential adverse public safety impacts from oil and gas leases associated with Alternative D.

Leases Subject to Settlement Agreement

The 14 non-NSO leases would not be likely to experience the full scope of the RFD Scenarios. However, the hazardous material and public safety impacts and mitigation are the same as Alternative A.

4.4.7 Impacts of Alternative E

This alternative increases the acreage closed to oil and gas leasing and development by approximately 32,000 acres more than Alternative A, but leaves close to a half million acres still open. This alternative has the most acreage (206,400 acres) with NSO restrictions. The open areas could experience development by up to 37 new wells and would have the same potential for hazardous material releases as Alternative A. The impacts to the public due to upset conditions are not expected to be significantly different from Alternative A.

Mitigation

Mitigation Measures PS-1 through PS-6 at the end of Section 4.4.3 include the types of measures that could be implemented to lessen the degree of potential adverse public safety impacts from oil and gas leases associated with Alternative E.

Leases Subject to Settlement Agreement

The 14 non-NSO leases would not be likely to experience the full scope of the RFD Scenarios. However, the hazardous material and public safety impacts and mitigation are the same as Alternative A.

4.5 Air Quality and Atmospheric Conditions

This section addresses impacts to air quality from activities allowed under the RMPA alternatives. The primary air quality impacts that can be reasonably expected to occur are emissions of combustion products and particulate matter from oil and gas development and production. This section describes the types of potential impacts the RMPA alternatives could have on air resources in the BLM Central Coast Field Office (CCFO) Planning Area, and it addresses the types of mitigation that could be implemented to lessen the degree of the impacts, where applicable.

4.5.1 Introduction

Approach to Impact Assessment

The RMPA alternatives would allow oil and gas development in some areas of the CCFO Planning Area. Oil and gas development involves extracting materials from the earth using various methods, and these are described in the Reasonably Foreseeable Development (RFD) Scenario (see Appendix B).

Extraction of petroleum resources generally requires preparing the site, drilling, installing well equipment, and storing or transporting the resource off-site. These processes produce air pollution in the form of engine exhaust emissions and fugitive dust from the transport of materials and the movement of vehicles over unpaved areas. Additional air pollution may be produced at extraction sites that include a facility for treatment or processing of the extracted oil and gas or byproducts of oil and gas extraction. Also, fugitive emissions of hydrocarbons would include volatile organic compounds (VOC), along with methane and hydrogen sulfide (H_2S) entrained in the oil and gas, and these emissions may occur at wellheads through leaking valves or behind casing in idle oil and gas wells.

Before initiating any type of oil and gas development, the entity proposing the development may need to apply for and obtain approval for air permits from the air district where the activity would be located. Each local air district issues permits that must be obtained before constructing and operating new stationary sources of air pollution. Facilities that do not include stationary sources of air pollution may not require an air permit. The permit rules provide for an evaluation of air quality impacts for the proposed activity, and the activity must be deemed acceptable by the administering APCD before an air permit would be approved.

There is one management goal relevant to Air Quality and Atmospheric Conditions from the 2007 HFO RMP that is restated here:

- The goal for air quality management under the Resource Management Plan (RMP) is to ensure that BLM authorizations and management activities comply with local, State, and Federal air quality regulations, requirements, State Implementation Plans (SIPs), and Regional Air Board standards and goals.

The Area-wide Air Quality Management Actions from the 2007 HFO RMP include:

- AIR-COM1. Incorporate mitigation for activities and projects on BLM lands in order to comply with applicable Federal, State, and local air quality regulations.
- AIR-COM2. Manage motorized vehicle travel on dirt roads to minimize air pollution from dust and exhaust by restricting vehicle types and seasons when vehicles could be used.

Three measures to protect air quality, which include one Additional Mitigation Measure, are identified as Management Guidance in the Oil and Gas Stipulations (Appendix D of the 2007 HFO RMP):

- Measures to Protect Air Quality: (A) All oil and gas exploration and development activities that require off-road vehicle use or surface disturbance would be required to obtain an air quality emission permit or verification that such permits are not appropriate from the regional air quality control board.

- Measures to Protect Air Quality: (B) All oil and gas exploration and development activities resulting in surface disturbance or requiring the use of motorized vehicles would be required to suppress fugitive dust emissions from paved and unpaved surfaces in accordance with local APCD regulations.
- Additional Mitigation Measure: (A) Air modeling studies per the requirements of the Monterey Bay Unified Air Pollution Control District Rule 207 would be required before any emissions are allowed on leases in the Pinnacles National Park.

BLM Best Management Practices/Standard Operating Procedures for air quality (Appendix D) could reduce emissions of dust and other air pollutants during oil and gas production by implementing techniques for controlling road dust and for reducing, capturing, and/or controlling vapors, leaks, fugitives, and other emissions related to energy development.

Types of Impacts

Oil and gas development activities could result in emissions causing air quality impacts if they:

- Exceed any air quality standard, contribute substantially to an existing or projected air quality violation, or result in a cumulatively considerable net increase of any criteria pollutant for which the geographic area is in nonattainment under an applicable Federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Exceed *de minimis* threshold values for pollutants in nonattainment or maintenance areas;
- Conflict with or obstruct implementation of an applicable air quality plan;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Affect long-term air quality as a result of operation and/or maintenance activities.

Assumptions

All activities must comply with applicable laws and regulations and may be subject to review for air pollutant emissions by the local air permitting authority. The potential air pollutant emissions from oil and gas development would occur in the following context:

- The operator of air pollutant emissions sources would coordinate with the local air permitting authority to seek necessary entitlements for oil and gas development including the completion of all necessary project-level environmental review requirements. Based on the results of the environmental review, the operator of emissions sources would implement all feasible mitigation measures identified in the environmental document to reduce or substantially lessen any significant air quality impacts of the project.
- The operator of emissions sources would apply for, secure, and comply with all appropriate air quality permits for project activities from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to mobilization.
- The operator of emissions sources would comply with the Clean Air Act and the California Clean Air Act, including the applicable determinations for project-specific Best Available Control Technologies within the New Source Review (NSR) process, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants.
- The operator of emissions sources would comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., avoiding nuisances related to fugitive dust particulate matter or odors, providing payment into off-site mitigation funds if determined to be necessary as a result of a project-level environmental review or NSR process).

- Any project that is anticipated to result in emissions that constitute a "major source" would be reviewed for potential impacts to sensitive receptors, including mandatory Federal Class I Areas. This would be completed at the site-specific NEPA stage.
- Downstream use of oil and gas, oil processing at refineries, and natural gas transmission and distribution are separate activities that would not be substantially affected by the RFD Scenario, aside from the need to carry produced oil and gas to the existing transmission pipeline network over a distance that is likely to be less than 10 miles.

4.5.2 Impacts Common to All Alternatives

The RFD Scenario (i.e., between zero and 37 development wells with approximately 206 acres of surface disturbance over the next 15 to 20 years on Federal mineral estate in the Planning Area) would occur under all of the alternatives.

For all alternatives, oil and gas exploration and development could occur anywhere that is open to oil and gas leasing within the CCFO Planning Area, although the most likely areas of development are on Federal mineral estate either in the North Central Coast air basin or in the San Joaquin Valley air basin. All oil and gas development activities would be subject to either the jurisdiction of either the MBUAPCD or SJVAPCD, depending on the location. The history of activity for oil and gas exploration and development on Federal mineral estate within the CCFO Planning Area portion of the San Francisco Bay Area air basin is limited, and for this reason, little or no new oil and gas activity or emissions is anticipated in the BAAQMD portion of the CCFO Planning Area.

For all alternatives, leases subject to the settlement agreement occur in the North Central Coast air basin and in the jurisdiction of the MBUAPCD. There are no leases subject to the settlement agreement located in the San Joaquin Valley air basin or the San Francisco Bay Area air basin.

Air Pollution Sources Associated with RFD Scenario

Anticipated emissions from oil and gas development include direct emissions of oxides of nitrogen (NOx), sulfur oxides (SOx), volatile organic compounds (VOC) and reactive organic gases (ROG), which are precursor emissions for ozone and PM2.5, carbon monoxide (CO), respirable particulate matter (PM10) and fine particulate matter (PM2.5). These emissions are associated with combustion sources such as diesel drill rig engines, drill pad construction equipment (i.e., dozers, backhoes, graders, etc.), temporary production flaring, remedial well work, equipment trucks, hauling of liquids, drill rig crew trucks/vehicles, portable lift equipment, portable electric power generators, portable testing equipment and temporary production facilities. Diesel emissions also occur from equipment used during well stimulation treatments, and materials handling causes emissions of PM10 and PM2.5. The steam generators used during enhanced oil recovery are also an important source of emissions from fuel combustion.

Vented gases and fugitive leaks that occur during all phases of well development and production are sources of ROG/VOC and methane, although these can often be detected and cost-effectively reduced, captured, recovered, or controlled by flaring.

In addition, PM10 is released during the drill pad construction phase and from the daily ingress and egress of vehicles on unpaved access roads. The primary emission sources during any new construction at the drill sites and on Rights of Way would be from heavy equipment exhaust and fugitive dust generation. Other emission sources occur during the operation and maintenance of the leases and Rights of Way. Other sources related to oil and gas production include oil facilities, gas facilities, operator vehicle traffic, and diesel or gas-powered oil well pumping units.

Adverse health impacts would be correlated to any potential increases in the ambient concentrations of criteria air pollutants caused by equipment and sources typical of oil and gas development. Ozone pre-

cursors that are a result of venting or fugitive losses (ROG) and equipment or mobile source exhaust (ROG and NOx) contribute to: aggravation of respiratory and cardiovascular diseases; reduced lung function; increased cough and chest discomfort. The fugitive dust emissions (PM10 and PM2.5) contribute to: reduced lung function; aggravation of respiratory and cardiovascular diseases; increases in mortality rate; reduced lung function growth in children. Dust emissions could also exacerbate the potential exposure of people to Valley Fever.

Oil and gas development under the RFD Scenario could introduce localized sources of odors by releasing sulfur-containing compounds that occur in the natural resources, primarily H_2S, and odorous organic compounds (including pentane and hexane) as ROG. These may be released as vented and fugitive emissions. Methane itself is odorless, but the odorous H_2S and organic compounds can escape to the air easily from produced oil, produced water, vented natural gas, and leaks. No other notable source of odors would occur because the use of diesel-fueled construction equipment would be limited by mandatory use of ultra-low sulfur diesel fuel. Under all alternatives, the sources of odors would occur only at well development sites, and so would not be likely to negatively affect a substantial number of people, depending on concentration, wind direction, and proximity to residential area or public facility.

Estimated Air Pollutant Emissions for RFD Scenario

Each alternative includes the 2015 RFD Scenario (i.e., 37 wells and 206 acres of surface disturbance). For informational purposes, reasonable emissions estimates for any year within the life of this plan are based on three wells per year being constructed and three wells undergoing well stimulation treatments on Federal mineral estate in the CCFO Planning Area. In the last 20 years, two Applications for Permit to Drill on existing BLM leases in the CCFO Planning Area have been submitted and then withdrawn. While construction of three wells per year would be higher than this trend, the two Applications for Permit to Drill were submitted in the last two years, and depending on economic conditions, a greater or fewer number of applications could be submitted any year. After the construction activities and emissions are completed, the new wells would transition into long-term operations and maintenance, when the oil and gas production activities and emissions would commence and then continue. The production-phase emissions assume all 37 wells transition to long-term operations and maintenance.

Table 4.5-1 quantifies the maximum anticipated levels of criteria air pollutant emissions during the years of wells being constructed on Federal mineral estate in the CCFO Planning Area, and Table 4.5-2 quantifies the emissions from long-term operations and/or maintenance activities upon full buildout of the RFD Scenario. These emissions would most likely be in the jurisdiction of either the MBUAPCD or SJVAPCD, depending on the location of the leases.

Table 4.5-1. Development Phase Planning Area Emissions for 2015 RFD Scenario (tons per year)

Development Activity (new well construction and well stimulation of 3 wells per year)	ROG	NOx	CO	SOx	PM10	PM2.5
Surface disturbance	—	—	—	—	27.2	4.1
New well development	0.09	1.46	0.42	0.00	0.05	0.05
Geophysical exploration	0.01	0.25	0.11	0.00	0.01	0.01
Well stimulation	0.15	3.10	0.49	0.00	0.09	0.09
Total (Development)	**0.25**	**4.81**	**1.01**	**0.01**	**27.34**	**4.22**
San Joaquin Valley Air Basin *de minimis* Threshold	**10**	**10**	**100**	**100**	**100**	**100**

Note: RFD Scenario emissions would most likely be in the jurisdiction of either the MBUAPCD or SJVAPCD, depending on the location of the leases. No *de minimis* thresholds apply within the North Central Coast air basin and MBUAPCD.

Table 4.5-2. Production Phase Planning Area Emissions for 2015 RFD Scenario (tons per year)

Operations and Maintenance Activity (long-term, upon buildout of 37 wells in RFD Scenario)	ROG	NOx	CO	SOx	PM10	PM2.5
Oil and gas production, combustion sources	0.13	3.59	0.21	1.04	1.77	1.77
Oil and gas production, vents and fugitives	9.23	—	—	—	—	—
Total (Production)	**9.37**	**3.59**	**0.21**	**1.04**	**1.77**	**1.77**
Total (Development and Production)	**9.62**	**8.40**	**1.22**	**1.04**	**29.11**	**5.99**
San Joaquin Valley Air Basin *de minimis* Threshold	**10**	**10**	**100**	**100**	**100**	**100**

Note: RFD Scenario emissions would most likely be in the jurisdiction of either the MBUAPCD or SJVAPCD, depending on the location of the leases. No *de minimis* thresholds apply within the North Central Coast air basin and MBUAPCD.

The air pollutant emissions would be expected to occur at levels that are below *de minimis* thresholds for pollutants in nonattainment or maintenance areas and below levels that would contribute substantially to an existing or projected air quality violation. The emissions would be predominately due to sources near well pads and along roadways accessing well sites on new Federal oil and gas leases with few, if any, scattered rural residences nearby. The sources would be focused to within 206 acres of surface in the RFD Scenario in all alternatives. Accordingly, the potential to contribute to an existing or projected air quality violation would be expected to be minor and localized, depending on the area open to leasing in each alternative. Long-term air quality impacts resulting from emissions of operations and/or maintenance activities upon full buildout of the RFD Scenario would be minor.

BLM requires that the lessee/operator ensure that all operations are properly permitted with the local air districts, and that the operations are in compliance with all mobile and stationary source guidelines. Required control measures include such items as dust control using application of water or pre-soaking and limiting traffic speed on unpaved roads. They also include measures such as use of low-emission construction equipment, and/or use of the existing electric distribution facilities, where available, rather than temporary power generators.

State and/or local air quality regulations applicable to the oil and gas development activities would reduce impacts through permit conditions or other restrictions on activities that control emissions to within levels acceptable to the local administering APCD. Examples of the restrictions include complying with rules and regulations for reducing, capturing, and/or controlling vapors, leaks, fugitives, and other emissions listed in this report in Section 3.5.2.

New Source Review and Prevention of Significant Deterioration

The Federal CAA requires NSR facility permitting for construction or modification of specified stationary sources for sources of designated nonattainment pollutants, and the Prevention of Significant Deterioration (PSD) program applies to new or modified major stationary sources of pollutants that occur in areas likely to attain the NAAQS. No major stationary sources of air pollution would be likely to occur as a result of the RMPA or under the 2015 RFD Scenario. While no actions or projects related to oil and gas leasing and development are anticipated to require a PSD permit as major stationary sources, minor sources can be expected to trigger the district-level New Source Review permitting process within either the MBUAPCD or SJVAPCD.

The types of facilities that would qualify as a stationary source and require an air permit from the local air permitting authority include: oil production and process equipment; oil/water separators; organic liquid storage tanks; waste gas flares; stationary engines and combustion turbines; and steam generators and boilers. Proposed BLM authorized actions that would result in substantial air pollutant emissions would be reviewed for potential PSD and NSR requirements and would need to secure all relevant air quality permits before operating.

Federal Class I Areas

The existing and active oil and gas fields within the Monterey County, San Benito County, and Fresno County portions of the CCFO Planning Area are within 100 kilometers of the Pinnacles National Park Class I Area. In the 2015 RFD Scenario, the development-phase sources, construction-type activities, and long-term operations and maintenance would not require use of any major stationary sources that could permanently affect regional air quality or long-range visibility. Therefore, air quality impacts to mandatory Federal Class I Areas, including deposition of pollutants to soil and water, visibility, and other air quality related values (AQRVs) would be expected to be minor.

The BLM, as a Federal land manager, has an "affirmative responsibility to protect the air quality and related values (including visibility)" of any Federal Class I Area that it administers, and to consider whether a proposed major emitting facility will have an adverse impact on those values. The BLM has a responsibility to consider potential air quality impacts on the public lands through the New Source Review permitting process, especially within mandatory Federal Class I Areas. Any project that is anticipated to result in emissions that constitute a "major source" would be reviewed for potential impacts to sensitive receptors, including mandatory Class I Areas. This would be completed at the site-specific NEPA stage.

General Conformity

As described in Section 3.5.2, a general conformity determination is required for any Federal action within any Federal nonattainment and/or maintenance area. Proposed BLM authorized actions in the CCFO Planning Area trigger this requirement if calendar year emissions would exceed 10 tons per year of VOC or NOx within the San Joaquin Valley air basin or exceed 100 tons per year of these pollutants in the San Francisco Bay Area air basin, or 100 tons per year of PM10 or PM2.5 in either air basin. No general conformity *de minimis* thresholds apply within the North Central Coast air basin.

The Clean Air Act and its implementing rules (40 CFR 93, Subpart B) state that Federal agencies must make a determination that proposed actions in Federal non-attainment and maintenance areas conform to the applicable implementation plan before the action is taken. In addition, the action cannot cause or contribute to any new violation of the NAAQS, cannot increase the frequency or severity of any existing violation of any NAAQS, or delay timely attainment of any standard or any required interim emission reduction or other milestones.

The BLM has developed a ten-step process to comply with the Federal conformity requirements. These ten steps are: (1) Determine spatial and jurisdiction applicability; (2) Describe SIP status and content; (3) Develop any necessary background information; (4) Develop air quality impact analysis; (5) Compare activity to applicable SIP provisions and rules; (6) Develop conclusion statement; (7) Prepare a formal determination; (8) Conduct an agency/public review; (9) Submit the determination to appropriate regulatory agencies; and (10) Archive the results. Steps 1-6 have been completed as part of this EIS. In accordance with (40 CFR 93.153 (b)(1&2)). Steps 7-10 of this process will not be completed for the RMPA because the total direct and indirect emissions from plan alternatives are likely to be less than *de minimis* levels (see Table 4.5-1 and Table 4.5-2).

4.5.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario, but would continue current management of air quality as set forth under the existing 2007 HFO RMP (BLM, 2007).

Alternative A would continue the current management goals, objectives, and direction as specified in the 2007 HFO RMP. Alternative A has approximately 683,800 acres currently open to oil and gas leasing and development. Activities and existing trends causing air quality impacts under the management actions for Energy and Minerals in Alternative A would continue as in the current conditions (Section 3.5.4). Stipulations would require oil and gas development activities to comply with applicable air quality regulations.

This would be consistent with the management goals for Air Quality and Atmospheric Conditions from the 2007 HFO RMP.

Oil and gas development in Alternative A would result in the types of air pollution sources and estimated levels of emissions that are described in Section 4.5.2, Impacts Common to All Alternatives. Emissions under Alternative A would be at the same levels as shown for the 2015 RFD Scenario in Table 4.5-1 and Table 4.5-2. The potential to contribute to an existing or projected air quality violation would be minor and localized, and the long-term air quality impacts resulting from emissions upon full buildout of the RFD Scenario would be minor.

Alternative A could result in emissions being located near a sensitive receptor because it would have most Federal mineral estate open to oil and gas leasing, with only certain areas currently closed under the 2007 HFO RMP (Section 2.6.1). This alternative would close fewer acres than other alternatives. Some of the areas open to oil and gas leasing would be near sensitive receptors. As such, Alternative A would have the greatest potential among the alternatives for causing a localized air quality impact to sensitive receptors.

Sensitive receptors would be affected by increased concentrations of air pollutants including hazardous air pollutants from construction activities and oil and gas production, depending on the proximity of the sensitive use. Existing surface uses that could occur near and be incompatible with oil and gas development include urban areas or population centers. Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly and convalescent facilities. Occupants of these existing uses or facilities are generally more susceptible to adverse effects of air pollution. Under Alternative A (No Action), these existing uses or facilities could experience unavoidable adverse impacts if oil and gas development is concentrated in one area and allowed to substantially increase air pollutant concentrations near existing sensitive receptors.

Mitigation

Mitigation Measures AQ-1 through AQ-3 include the types of measures that could be implemented to lessen the degree of potential adverse air quality impacts from development of oil and gas leases under Alternative A. During review of whether to accept or deny project proposals, BLM managers can decide to attach additional stipulations or measures, such as the following, to minimize or avoid air quality impacts.

AQ-1 **Control or Suppress Fugitive Dust.** Comply with a Fugitive Dust Control Plan that addresses emissions of fugitive dust during all stages of oil and gas development, including the implementation of the standard and enhanced dust control strategies identified by the local air district. The Fugitive Dust Control Plan would reduce PM10 and PM2.5 during construction and operations. Examples of such measures include:

- limiting the speeds of construction vehicles on unpaved surfaces to 15 miles per hour,
- posting visible speed limit signs at construction site entrances,
- during grading, use water, as necessary, on disturbed areas in construction sites to control visible plumes,
- suspending excavation and grading activities when winds exceed 20 miles per hour,
- limiting the size of area subject to excavation, grading, or other construction disturbance at any one time to avoid excessive dust,
- applying non-toxic soil stabilizers or soil weighting agents according to manufacturers' specifications to all construction areas that have been previously graded and are inactive for ten days or more,
- covering or treating soil storage piles with appropriate dust suppressant compounds,

- using wind erosion control techniques (such as windbreaks, water, dust suppressants, and/or vegetation) where soils are disturbed in construction, access and maintenance routes, and materials stock pile areas
- covering all trucks hauling dirt, sand, soil, or other loose materials,
- using enclosures, covers, flexible intermediate bulk containers, or rigid intermediate bulk containers for the storage, handling, and transfer of bulk dry materials such as sand, gravel and other dry additives used in well stimulation treatments,
- expeditiously removing the accumulation of mud or dirt from adjacent public streets at least twice every 24 hours when construction activities are occurring,
- inspecting and washing construction equipment vehicle tires, as necessary, so they are free of dirt before entering paved roadways, if applicable,
- providing gravel ramps of at least 20 feet in length at tire washing/cleaning stations, and ensuring construction vehicles exit construction sites through treated entrance roadways, unless an alternative route has been approved by appropriate lead agencies, if applicable,
- using sandbags or equivalent effective measures to prevent runoff to roadways in construction areas adjacent to paved roadways; ensure consistency with the project's Storm Water Pollution Prevention Plan, if such a plan is required for the project, and
- limiting operating hours and engine run-time for heavy equipment.

AQ-2 **Control Off-Road Vehicle Engine Exhaust.** Use off-road equipment with low-emission engines during all stages of oil and gas development. Potential strategies include relying on electricity from the distribution grid for power instead of using portable generators and requiring all off-road diesel engines to meet the most stringent of applicable Federal or State standards. Use equipment meeting at a minimum the Tier 3 (with proper diesel particulate controls), or better (Tier 4) California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations (CCR) Title 13, Division 3, Chapter 9, Article 4, Sec. 2423(b)(1). Consider using electric vehicles where possible. In addition, if not already supplied with a factory-equipped diesel particulate filter, all construction equipment shall be outfitted with Verified Diesel Emissions Control Strategies (VDECS) devices certified by ARB. Any emissions control device used shall achieve emissions reductions that are no less than what could be achieved by a Level 3 VDECS diesel emissions control strategy for a similarly sized engine as defined by ARB regulations. Plan construction scheduling to minimize vehicle trips. Limit idling of heavy equipment to less than 5 minutes and verify through inspections. Maintain and tune engines per manufacturer's specifications to perform at ARB and/or U.S. EPA certification levels, prevent tampering, and conduct unscheduled inspections to ensure these measures are followed.

AQ-3 **Offset Emissions to Reduce Residual Impacts.** Use offsets or emission reduction credits to further reduce the residual impact of emissions from stationary sources, portable equipment and mobile sources related to oil and gas development. This may include participating in a proposed or established program for offsetting criteria air pollutants consistent with local air pollution control district or air quality management district recommendations.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued. Oil and gas leasing and development within the leases subject to the settlement agreement would create emissions within the North Central Coast air basin and in the jurisdiction of the MBUAPCD. Air quality impacts would occur within the North Central Coast air basin as described for Alternative A in general.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.5.4 Impacts of Alternative B

Alternative B air quality impacts in the Planning Area are analyzed below. Alternative B would open areas within the boundaries of oil and gas fields, plus a buffer. Alternative B would close all areas outside of oil and gas fields plus a buffer, which would result in about 39,000 acres open to oil and gas leasing and development. In contrast with the 2015 RFD Scenario, Alternative B would not have 5 exploratory wells, and ground disturbance would be 179 acres because development is limited to the existing oil and gas fields, plus buffer.

The available lands would be subject to stipulations that would require oil and gas development activities to comply with applicable air quality regulations and to minimize or eliminate conflict between oil and gas development and existing surface uses. This would be consistent with the management goals for Air Quality and Atmospheric Conditions from the 2007 HFO RMP.

Oil and gas development in Alternative B would result in the types of air pollution sources and estimated levels of emissions that are described in Section 4.5.2, Impacts Common to All Alternatives. Emissions under Alternative B would be at the same levels as shown for the 2015 RFD Scenario in Table 4.5-1 and Table 4.5-2. The potential to contribute to an existing or projected air quality violation would be minor and localized, and the long-term air quality impacts resulting from emissions upon full buildout of the RFD Scenario would be minor.

Alternative B would have a limited potential to result in emissions being located near a sensitive receptor. This alternative would close more acres than other alternatives. As such, Alternative B would have the least potential among the alternatives for causing a localized air quality impact to sensitive receptors.

The CSU Existing Surface Use/Management stipulation would be applied to areas where the BLM authorized officer determines that pre-existing surface management uses/conditions would be incompatible with or preclude oil and gas operations. This CSU stipulation ensures that proposed activity would be reviewed cooperatively with the surface manager to determine if it is compatible with the existing uses/conditions, and if not, the activity would be moved or possibly even denied/rejected. This would minimize or eliminate the potential for emissions from oil and gas development to cause substantial air pollutant concentrations and a potentially adverse impact to existing sensitive receptors.

The air quality impacts under the management actions for Energy and Minerals in Alternative B would be generally confined by requiring sources to be within existing oil and gas fields plus a buffer. By confining oil and gas leasing to the existing fields plus the buffer, Alternative B would be likely to avoid exposing sensitive receptors to substantial pollutant concentrations.

Mitigation

Mitigation Measures AQ-1 through AQ-3 at the end of Section 4.5.3 include the types of measures that could be implemented to lessen the degree of potential adverse air quality impacts from oil and gas leases and development associated with Alternative B.

Leases Subject to Settlement Agreement

Oil and gas leasing and development within the leases subject to the settlement agreement would create emissions within the North Central Coast air basin and in the jurisdiction of the MBUAPCD. Air quality impacts would occur within the North Central Coast air basin as described for Alternative B in general.

4.5.5 Impacts of Alternative C

Alternative C air quality impacts in the Planning Area are analyzed below. Alternative C would open areas within high oil and gas potential areas or within the boundaries of oil and gas fields, plus a buffer, with the exception of core population areas of the giant kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills, which are closed to leasing. Alternative C would close areas that do not have high oil and gas occurrence potential.

The available lands would be subject to stipulations that would require oil and gas development activities to comply with applicable air quality regulations and to minimize or eliminate conflict between oil and gas development and existing surface uses. This would be consistent with the management goals for Air Quality and Atmospheric Conditions from the 2007 HFO RMP.

Oil and gas development in Alternative C would result in the types of air pollution sources and estimated levels of emissions that are described in Section 4.5.2, Impacts Common to All Alternatives. Emissions under Alternative C would be at the same levels as shown for the 2015 RFD Scenario in Table 4.5-1 and Table 4.5-2. The potential to contribute to an existing or projected air quality violation would be minor and localized, and the long-term air quality impacts resulting from emissions upon full buildout of the RFD Scenario would be minor.

Alternative C would have a potential to result in emissions being located near a sensitive receptor. However, the CSU Existing Surface Use/Management stipulation would be applied to available areas to ensure that proposed activity would be reviewed cooperatively with the surface manager to determine if it is compatible with the existing uses/conditions, and if not, the activity would be moved or possibly even denied/rejected. This would minimize or eliminate the potential for emissions from oil and gas development to cause substantial air pollutant concentrations and a potentially adverse impact to existing sensitive receptors.

Mitigation

Mitigation Measures AQ-1 through AQ-3 at the end of Section 4.5.3 include the types of measures that could be implemented to lessen the degree of potential adverse air quality impacts from oil and gas leases and development associated with Alternative C.

Leases Subject to Settlement Agreement

Oil and gas leasing and development within the leases subject to the settlement agreement would create emissions within the North Central Coast air basin and in the jurisdiction of the MBUAPCD. Air quality impacts would occur within the North Central Coast air basin as described for Alternative C in general.

4.5.6 Impacts of Alternative D

Alternative D air quality impacts in the Planning Area are analyzed below. Alternative D would open areas of Federal mineral estate underlying BLM surface estate. Alternative D would close all BLM split estate lands and the Ciervo Panoche Natural Area.

The available lands would be subject to stipulations that would require oil and gas development activities to comply with applicable air quality regulations and to minimize or eliminate conflict between oil and gas development and existing surface uses. This would be consistent with the management goals for Air Quality and Atmospheric Conditions from the 2007 HFO RMP.

Oil and gas development in Alternative D would result in the types of air pollution sources and estimated levels of emissions that are described in Section 4.5.2, Impacts Common to All Alternatives. Emissions under Alternative D would be at the same levels as shown for the 2015 RFD Scenario in Table 4.5-1 and Table 4.5-2. The potential to contribute to an existing or projected air quality violation would be minor

and localized, and the long-term air quality impacts resulting from emissions upon full buildout of the RFD Scenario would be minor.

Alternative D would have a limited potential to result in emissions being located near a sensitive receptor. The CSU Existing Surface Use/Management stipulation would be applied to available areas to ensure that proposed activity would be reviewed to determine if it is compatible with the existing uses/conditions. This would minimize or eliminate the potential for emissions from oil and gas development to cause substantial air pollutant concentrations and a potentially adverse impact to existing sensitive receptors.

The air quality impacts under the management actions for Energy and Minerals in Alternative D would be generally confined by requiring sources to be within BLM surface estate. By confining oil and gas leasing to the BLM surface estate, Alternative D would be likely to avoid exposing sensitive receptors to substantial pollutant concentrations.

Mitigation

Mitigation Measures AQ-1 through AQ-3 at the end of Section 4.5.3 include the types of measures that could be implemented to lessen the degree of potential adverse air quality impacts from oil and gas leases and development associated with Alternative D.

Leases Subject to Settlement Agreement

Oil and gas leasing and development within the leases subject to the settlement agreement would create emissions within the North Central Coast air basin and in the jurisdiction of the MBUAPCD. Air quality impacts would occur within the North Central Coast air basin as described for Alternative D in general.

4.5.7 Impacts of Alternative E

Alternative E air quality impacts in the Planning Area are analyzed below. Alternative E would open areas of Federal mineral estate outside of a California DWR Bulletin 118 Groundwater Basin and Sub-basin.

The available lands would be subject to stipulations that would require oil and gas development activities to comply with applicable air quality regulations and to minimize or eliminate conflict between oil and gas development and existing surface uses. This would be consistent with the management goals for Air Quality and Atmospheric Conditions from the 2007 HFO RMP.

Oil and gas development in Alternative E would result in the types of air pollution sources and estimated levels of emissions that are described in Section 4.5.2, Impacts Common to All Alternatives. Emissions under Alternative E would be at the same levels as shown for the 2015 RFD Scenario in Table 4.5-1 and Table 4.5-2. The potential to contribute to an existing or projected air quality violation would be minor and localized, and the long-term air quality impacts resulting from emissions upon full buildout of the RFD Scenario would be minor.

Alternative E would have a potential to result in emissions being located near a sensitive receptor. However, the CSU Existing Surface Use/Management stipulation would be applied to available areas to ensure that proposed activity would be reviewed cooperatively with the surface manager to determine if it is compatible with the existing uses/conditions, and if not, the activity would be moved or possibly even denied/rejected. This would minimize or eliminate the potential for emissions from oil and gas development to cause substantial air pollutant concentrations and a potentially adverse impact to existing sensitive receptors.

Mitigation

Mitigation Measures AQ-1 through AQ-3 at the end of Section 4.5.3 include the types of measures that could be implemented to lessen the degree of potential adverse air quality impacts from oil and gas leases and development associated with Alternative E.

Leases Subject to Settlement Agreement

Oil and gas leasing and development within the leases subject to the settlement agreement would create emissions within the North Central Coast air basin and in the jurisdiction of the MBUAPCD. Air quality impacts would occur within the North Central Coast air basin as described for Alternative E in general.

4.6 Climate Change/Greenhouse Gas Emissions

This section addresses impacts to GHG emissions (a proxy for impacts to climate change) from activities allowed under the RMPA alternatives. The primary GHG impacts that can be reasonably expected to occur are emissions from the combustion of fossil fuels and from releases of CO_2 and methane due to oil and gas development and production. Discussions of impacts to other resources that are affected by climate change appear in the respective sections in Chapter 4.

4.6.1 Introduction

Approach to Impact Assessment

The RMPA alternatives would allow oil and gas development in some areas of the BLM Central Coast Field Office (CCFO) Planning Area. Oil and gas development involves extracting materials from the earth using various methods, and these are described in the Reasonably Foreseeable Development (RFD) Scenario (see Appendix B).

Extraction of petroleum resources generally requires preparing the site, drilling, installing well equipment, and storing or transporting the resource off-site. These processes directly produce GHG in engine exhaust emissions and cause CO_2 and methane to be released as a result of treatment or processing of the extracted oil and gas or the byproducts of oil and gas extraction.

Before initiating any type of oil and gas development, the entity proposing the development may need to apply for and obtain approval for air permits from the air district, and air permits may include provisions for controlling GHG emissions, namely methane, as part of a program to reduce leaks or vents of organic compounds.

BLM Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D) could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane.

Types of Impacts

Oil and gas development activities would directly result in GHG emissions. The directly emitted GHG may result in an indirect or cumulative impact to climate change if the emissions conflict with any applicable plan, policy, regulation, or goals adopted for the purpose of reducing GHG emissions. Those plans, policies, regulations and goals are listed in this report in Section 3.6.2.

Assumptions

All activities must comply with applicable laws and regulations and may be subject to review for certain types of GHG emissions by the local air permitting authority. The potential GHG emissions from oil and gas development would occur in the following context:

- The oil and gas produced by the development described in the RFD Scenario would be delivered into California's existing energy supply system, which would not need to be modified to accommodate the incremental production. California is implementing and will continue to implement numerous State laws, policies, and programs specifically designed to reduce the demand and need for conventional energy from oil and gas resources.
- The California Air Resources Board (ARB) requires any operator of GHG sources in the Petroleum and Natural Gas Systems source category to quantify and report CO_2, CH_4, and N_2O emissions, when stationary combustion and process emissions equal or exceed 10,000 metric tons CO2e or their stationary combustion, process, fugitive, and vented emissions equal or exceed 25,000 metric tons of CO2e, from seventeen source types on a well-pad or associated with a well-pad (17 CCR 95152(c)).

- Operators of GHG sources in the category of Petroleum and Natural Gas Systems became covered by the Cap-and-Trade Program on January 1, 2013 (17 CCR 95852.2(b)), along with other large industrial facilities, electric generating utilities, and electricity importers.
- Downstream use of oil and gas, oil processing at refineries, and natural gas transmission and distribution are separate activities that would not be substantially affected by the RFD Scenario, aside from the need to carry produced oil and gas to the existing transmission pipeline network over a distance that is likely to be less than 10 miles. The GHG emissions from end-use of oil and gas produced by leasing and development activity in the CCFO Planning Area would be indirect effects of the production because the emissions would occur at a different time and farther removed in distance from the leasing and development activity.

The discussion of cumulative impacts appears in Section 5.3.5. Globally, GHG emissions contribute, by their nature, on a cumulative basis to the adverse environmental impacts of global climate change. Because the primary environmental effect of GHG emissions would be to exacerbate global climate change and the numerous side-effects on the environment and humans, the area of influence for GHG impacts is global. However, those effects of climate change would also be manifested on resources and ecosystems in California, as summarized in the discussions of Climate Change Indicators and Evidence as part of the Current Conditions and Trends, Section 3.6.4.

4.6.2 Impacts Common to All Alternatives

The RFD Scenario (i.e., between zero and 37 development wells with approximately 206 acres of surface disturbance over the next 15 to 20 years on Federal mineral estate in the Planning Area) would occur under all of the alternatives. However, a maximum of 32 wells is considered for Alternative B because leasing is allowed only within current oil and gas fields plus a 0.5-mile buffer defined by DOGGR, which would not allow for any exploratory wells.

For all alternatives, oil and gas exploration and development could occur anywhere that is open to oil and gas leasing within the CCFO Planning Area, although the most likely areas of development are either in the North Central Coast air basin or in the San Joaquin Valley air basin. Little or no new oil and gas activity is anticipated in the BAAQMD portion of the CCFO Planning Area.

For all alternatives, leases subject to the settlement agreement occur in the North Central Coast air basin and in the jurisdiction of the MBUAPCD, and there are no leases subject to the settlement agreement located in the San Joaquin Valley air basin or the San Francisco Bay Area air basin.

GHG Sources Associated with RFD Scenario

Anticipated GHG emissions from oil and gas development include direct emissions of CO_2 due to fuel combustion by all equipment and vehicles, including drill rig engines, drill pad construction equipment, temporary production flaring, remedial well work, equipment trucks, hauling of liquids, drill rig crew trucks/vehicles, portable lift equipment, portable testing equipment and temporary production facilities. Combustion emissions also occur from equipment used during well stimulation treatments and from boilers or steam generators used during enhanced oil recovery (EOR).

Vented gases and fugitive leaks that occur during all phases of well development and production are sources of volatile organic compounds (VOC) and reactive organic gases (ROG), which are regulated as air pollutants (Section 3.5 and Section 4.5), and methane, although these can often be detected and cost-effectively reduced, captured, recovered, or controlled by flaring.

Estimated GHG Emissions for 2015 RFD Scenario

Each alternative includes the 2015 RFD Scenario (i.e., 37 wells and 206 acres of surface disturbance). For informational purposes, reasonable emissions estimates for any year within the life of this plan were calculated and are based on three wells per year being constructed and three wells undergoing well stimu-

lation treatments on Federal mineral estate in the CCFO Planning Area. After the construction activities and emissions are completed, the new wells would transition into long-term operations and maintenance, when the oil and gas production activities and emissions would commence and then continue. The production-phase emissions assume all 37 wells transition to long-term operations and maintenance.

Table 4.6-1 quantifies the anticipated levels of GHG emissions during the years of wells being developed on Federal mineral estate, and Table 4.6-2 quantifies the GHG emissions from long-term operation and/or maintenance activities upon full buildout of the RFD Scenario. Boilers or steam generators used during EOR would cause the majority of GHG emissions during the production phase. These emissions would most likely be in the jurisdiction of either the MBUAPCD or SJVAPCD, depending on the location of the leases.

Table 4.6-1. Development Phase GHG Emissions for 2015 RFD Scenario (metric tons per year)

Development Activity (new well construction and well stimulation of three wells per year)	CO2e (MTCO2e per year)
New Well Development with Surface Disturbance	200.1
Geophysical Exploration	57.3
Well Stimulation	327.0
Total (Development)	**584.4**

Table 4.6-2. Production Phase GHG Emissions for 2015 RFD Scenario (metric tons per year)

Operations and Maintenance Activity (long-term, upon buildout of 37 wells in RFD Scenario)	CO2e (MTCO2e per year)
Oil and Gas Production, combustion sources	18,500.0
Oil and Gas Production, vents and fugitives	(included above)
Total (Production)	**18,500**
Total (Development and Production)	**19,084**

The directly emitted GHG would occur at levels that are below the 25,000 MTCO2e annual threshold for mandatory reporting of GHG in the U.S. EPA Mandatory Reporting Program (40 CFR Part 98). If combustion or process emissions for an individual production facility were to exceed 10,000 MTCO2e per calendar year, then the ARB mandatory reporting requirements would become applicable to that facility.

Additional GHG emissions would occur as an indirect effect during end-use of oil and gas produced by leasing and development activity in the CCFO Planning Area. A rough estimate of possible indirect CO_2 emissions is provided below based on the RFD Scenario and other publicly available information. For informational purposes, we have summarized these possible indirect emissions by estimating 318,718 barrels of crude oil anticipated to be produced annually based on the historic production capabilities of active wells in existing fields within the CCFO Planning Area. Using the assumptions outlined below, Table 4.6-3 quantifies 141,062 metric tons of CO_2 of GHG emissions from end use of crude oil that could possibly be produced annually by full buildout of the RFD Scenario.

Table 4.6-3. Estimated Indirect End Use GHG Emissions for 2015 RFD Scenario

Reference	CO_2 Emission Factor	Resulting Estimate of End Use Emissions	CO2e (MTCO2e per year)
IPCC	73,300 kg/TJ	325,723,502 CO_2 lb/yr	147,747
EIA, 2011	10.29 kg/gallon	303,669,069 CO_2 lb/yr	137,743
EPA, 2016	74.54 kg/MMBtu	303,566,371 CO_2 lb/yr	137,697
Estimated Indirect CO_2 Emissions		**310,986,314 CO_2 lb/yr**	**141,062**

Sources:
Intergovernmental Panel on Climate Change (IPCC), 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2, Energy, 2006, Table 2.2 Default Emission Factors for Stationary Combustion in the Energy Industries (kg of greenhouse gas per TJ on a Net Calorific Basis).
U.S. EIA, 2011. Voluntary Reporting of Greenhouse Gases Program. Fuel Emission Coefficients Table 1 (CO2 for Stationary Combustion).
U.S. EPA, 2016. Mandatory Greenhouse Gas Reporting Regulation. 40 CFR Part 98, Subpart C, Table C-1. (Default HHV, CO2 factors).

With respect to the rough estimate of indirect CO_2 emissions, it should be noted that it is difficult to discern with certainty what end uses for the fuels extracted from a particular lease might be reasonably foreseeable. For instance, some end uses of fossil fuels extracted from Federal leases include: combustion of transportation fuels, fuel oils for heating or industrial use, as well as production of asphalt and road oil, and the feedstocks used to make chemicals, plastics, and synthetic materials. The estimate is based on an approximation of these end uses on a national basis using the references cited. While the BLM based these estimates on national data about typical end use of produced oil and gas, it is important to note that the BLM does not exercise control over the specific end use of the oil and gas produced from any individual Federal lease.

The GHG emissions from oil and gas development and production, if allowed by leasing, would occur along with indirect emissions from end-users of the fuels. However, these direct and indirect emissions would not be likely to conflict with any applicable plan, policy, regulation, or goals adopted for the purpose of reducing GHG emissions. California's regulatory setting, including reporting of GHG and the Cap-and-Trade Program (Section 3.6.2, Regulatory Framework), provides oversight and management of GHG directly emitted during development and production and indirectly emitted by end users of the petroleum products. The GHG emissions and the associated direct and indirect impacts would be minor.

A Federal Interagency Working Group on the Social Cost of Carbon (SCC) developed a social cost of carbon protocol for use in the context of Federal agency rulemaking. The Interagency Working Group issued estimates of the social cost of carbon, which reflect the monetary cost incurred by the emission of one additional metric ton of CO_2. The aim of SCC analysis would be to model the effects of the proposed action on the welfare of future generations at a global scale caused by additional carbon emissions occurring in the present.

The BLM finds that including monetary estimates of the social cost of carbon in its NEPA analysis for this proposed action, which is not a rulemaking, would not be useful. There are several challenges involved in attempting to apply the social cost of carbon protocol to the analysis for this project. For example:

- The GHG emissions estimates, and thus the social costs associated with these emissions, are the same across all alternatives.
- Monetizing only certain benefits or costs can lead to an unbalanced assessment. A comprehensive regional economic impact analysis is often used to estimate impacts on economic activity, expressed as projected changes in employment, personal income, or economic output. The NEPA analysis for the proposed action does not provide such estimates, which are not monetized as benefits or costs.

- The social cost of carbon estimates developed by the IWG focus on the effects of CO_2 emissions. These effects must be balanced with the costs and benefits of reducing other GHG emissions across all stages of oil and gas production, such as with controls for methane, which would have different short-term and long-term effects. Again, monetizing only certain effects can lead to an unbalanced assessment.

Oil and gas development activities would not disrupt the statewide emissions reduction goals set by the Global Warming Solutions Act of 2006 (AB 32) and subsequent programs. State climate change programs and/or local air quality regulations applicable to oil and gas development activities would require reporting and controlling GHG through permit conditions or participation by the operators in mandatory programs for GHG management. For larger operators, compliance with Cap-and-Trade Program provisions would ensure that California's overall GHG emissions remain consistent with statewide-targeted levels.

Suppliers of transportation fuels and the end-use of oil and gas as a transportation fuel in California would need to comply with California's Low Carbon Fuel Standard (LCFS). Under this program, transportation fuel suppliers must demonstrate that the mix of fuels they provide meet the carbon intensity standards of the LCFS, where the carbon intensity is a measure of the GHG emissions associated with the various production, distribution, and use steps in the "life-cycle" of the fuel. This ensures that downstream use of oil and gas as a transportation fuel would meet the LCFS. Additionally, fuel suppliers, including refiners, pipeline companies and railroads, generally bear the compliance obligation in the Cap-and-Trade Program for the GHG from end-use of the petroleum products for fuel users not otherwise covered. This means that the combustion emissions of the fuel delivered to all end-users are covered in the Cap-and-Trade Program.

4.6.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario while continuing current management under the existing 2007 HFO RMP (BLM, 2007). The 2007 HFO RMP did not define goals, objectives, or management actions for GHG or Climate Change.

Oil and gas leasing and development activities under the management actions for Energy and Minerals in Alternative A would result in direct and indirect impacts from GHG emissions that would be minor and at the same level as described in Section 4.6.2, Impacts Common to All Alternatives.

Mitigation

The BLM would require Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D). These could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane. No additional mitigation is recommended for Alternative A.

As BLM evaluates potential mitigation of GHG emissions and the interaction of a proposed action with climate change, it will also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented. BLM will consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane. Finally, BLM recognizes the value of monitoring to ensure that mitigation is carried out as provided in a record of decision.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued. The leases subject to the settlement agreement would result in GHG emissions as described in Section 4.6.2, Impacts Common to All Alternatives that would occur in the North Central Coast air basin, in the jurisdiction of the MBUAPCD.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.6.4 Impacts of Alternative B

Oil and gas development and GHG emissions would occur at less than the maximum levels projected with the 2015 RFD Scenario, because Alternative B would not have 5 exploratory wells, and ground disturbance would be up to 179 acres. Alternative B would include only areas within the boundaries of oil and gas fields, plus a buffer, so all impacts assumed from the maximum of 5 exploratory wells would not occur.

Oil and gas leasing and development activities under the management actions for Energy and Minerals in Alternative B would result in direct and indirect impacts from GHG emissions that would be minor and at the same level as described in Section 4.6.2, Impacts Common to All Alternatives.

Mitigation

The BLM would require Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D). These could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane. No additional mitigation is recommended for Alternative B.

As BLM evaluates potential mitigation of GHG emissions and the interaction of a proposed action with climate change, it will also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented. BLM will consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane. Finally, BLM recognizes the value of monitoring to ensure that mitigation is carried out as provided in a record of decision.

Leases Subject to Settlement Agreement

The leases subject to the settlement agreement would result in GHG emissions as described in Section 4.6.2, Impacts Common to All Alternatives that would occur in the North Central Coast air basin, in the jurisdiction of the MBUAPCD.

4.6.5 Impacts of Alternative C

Oil and gas development and GHG emissions would occur at up to the levels projected with the 2015 RFD Scenario. Although Alternative C would include only areas within high oil and gas potential areas or within the boundaries of oil and gas fields, plus a buffer, virtually all development is expected to occur in these areas.

Oil and gas leasing and development activities under the management actions for Energy and Minerals in Alternative C would result in direct and indirect impacts from GHG emissions that would be minor and at the same level as described in Section 4.6.2, Impacts Common to All Alternatives.

Mitigation

The BLM would require Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D). These could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane. No additional mitigation is recommended for Alternative C.

As BLM evaluates potential mitigation of GHG emissions and the interaction of a proposed action with climate change, it will also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented. BLM will consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane. Finally, BLM recognizes the value of monitoring to ensure that mitigation is carried out as provided in a record of decision.

Leases Subject to Settlement Agreement

The leases subject to the settlement agreement would result in GHG emissions as described in Section 4.6.2, Impacts Common to All Alternatives that would occur in the North Central Coast air basin, in the jurisdiction of the MBUAPCD.

4.6.6 Impacts of Alternative D

Oil and gas development and GHG emissions would occur at the levels projected with the 2015 RFD Scenario, although Alternative D would include only areas of Federal mineral estate underlying BLM surface estate.

Oil and gas leasing and development activities under the management actions for Energy and Minerals in Alternative D would result in direct and indirect impacts from GHG emissions that would be minor and at the same level as described in Section 4.6.2, Impacts Common to All Alternatives.

Mitigation

The BLM would require Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D). These could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane. No additional mitigation is recommended for Alternative D.

As BLM evaluates potential mitigation of GHG emissions and the interaction of a proposed action with climate change, it will also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented. BLM will consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane. Finally, BLM recognizes the value of monitoring to ensure that mitigation is carried out as provided in a record of decision.

Leases Subject to Settlement Agreement

The leases subject to the settlement agreement would result in GHG emissions as described in Section 4.6.2, Impacts Common to All Alternatives that would occur in the North Central Coast air basin, in the jurisdiction of the MBUAPCD.

4.6.7 Impacts of Alternative E

Oil and gas development and GHG emissions would occur at the levels projected with the 2015 RFD Scenario, although Alternative E would include areas of Federal mineral estate outside of a California DWR Bulletin 118 Groundwater Basin and Sub-basin.

Oil and gas leasing and development activities under the management actions for Energy and Minerals in Alternative E would result in direct and indirect impacts from GHG emissions that would be minor and at the same level as described in Section 4.6.2, Impacts Common to All Alternatives.

Mitigation

The BLM would require Best Management Practices/Standard Operating Procedures for Air Quality (Appendix D). These could reduce emissions of GHG during oil and gas production by implementing techniques to control vapors, leaks, fugitives, and other emissions that contain CO_2 and methane. No additional mitigation is recommended for Alternative E.

As BLM evaluates potential mitigation of GHG emissions and the interaction of a proposed action with climate change, it will also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented. BLM will consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane. Finally, BLM recognizes the value of monitoring to ensure that mitigation is carried out as provided in a record of decision.

Leases Subject to Settlement Agreement

The leases subject to the settlement agreement would result in GHG emissions as described in Section 4.6.2, Impacts Common to All Alternatives that would occur in the North Central Coast air basin, in the jurisdiction of the MBUAPCD.

4.7 Groundwater Resources

Potential impacts of oil and gas production on groundwater resources are described in this section for each of the Draft RMP alternatives. The approach to the impact analysis is discussed in Section 4.7.1. Potential impacts to groundwater resources that are common to all alternatives are discussed in Section 4.7.2. Potential impacts and mitigation associated with each of the five alternatives, including the No Action alternative, are described in Sections 4.7.3 through 4.7.7.

4.7.1 Introduction

Approach to Impact Assessment

The impacts analysis evaluates both quantity and quality of groundwater resources with a focus on usable water, defined in the BLM final rule on hydraulic fracturing as waters containing less than 10,000 mg/L TDS outside of an exempt aquifer (see 43 CFR Part 3160.0-5 for the complete definition). The terms *usable water* and *usable groundwater* are used interchangeably in the EIS sections on groundwater resources. For all alternatives, the RFD Scenario is assumed, which includes up to 37 new oil and gas wells to be drilled in the CCFO Planning Area. Also assumed in the RFD Scenario is that all wells may be treated with well stimulation techniques (including hydraulic fracturing). The RFD Scenario includes 32 of the wells that would be likely drilled in existing oil and gas fields but could potentially be drilled anywhere in the CCFO Planning Area and up to five wells likely outside of existing oil and gas fields. Because Alternative B only includes Federal mineral estate within oil and gas fields, a maximum of 32 wells is assumed for Alternative B; remaining alternatives are assumed to contain the maximum 37 wells.

Although the alternatives vary as to which parcels of BLM mineral estate will be open to oil and gas leases, this approach will make a conservative, worst-case assumption that the total number of wells can be drilled on any Federal mineral estate available in the associated alternative. For Alternative B, up to 32 wells can be drilled on any Federal mineral estate within an oil and gas field; for all remaining alternatives, up to 37 wells can be drilled on any Federal mineral estate open under that alternative. Recent oil and gas development has been concentrated in four existing fields: Coalinga and Jacalitos fields in western Fresno County and San Ardo and Lynch Canyon fields in Monterey County. BLM administers Federal mineral estate in all of these fields except the Lynch Canyon field.

The analysis is conducted to ensure that outcomes are consistent with the proposed RMP management goals provided in the 2007 RMP for the CCFO Planning Area (BLM, 2007). For water resources, the RMP goals include (1) maintain, restore, or improve water quality and quantity to sustain the designated beneficial uses on Federal mineral estate and (2) ensure that surface and groundwater quality comply with the Clean Water Act (CWA) and with California State standards. The first goal is consistent with the State's Porter Cologne Act (see Section 3.7.2) and the basin plans developed by the State Water Resources Control Board (SWRCB). The second goal addresses the State's Anti-degradation Policy. Also incorporated into the analysis are the BLM objectives to achieve those goals, along with the area-wide management actions related to groundwater (BLM, 2007).

The approach for analyzing impacts on groundwater quantity includes a review of published information of water use for oil and gas drilling and well stimulation. The total amount of water needed for the 2015 RFD Scenario is tabulated and compared to groundwater resources in the CCFO Planning Area. The approach to the impacts analysis for groundwater quality focuses on the pathways by which flowback and/or formation fluids could reach usable groundwater. The chemical composition of well stimulation fluids and associated formation fluids is considered. To meet RMP management goals and to comply with water quality standards in California, usable groundwater is assumed to be impacted if well stimulation fluids and associated formation fluids are likely to migrate into the usable groundwater zone via any of the identified pathways.

BLM regulations titled "Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands; Final Rule," were issued in March 2015 and contain numerous protective measures that address groundwater impacts from hydraulic fracturing. On June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule. The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). Therefore, this impacts assessment describes potential risk of hydraulic fracturing to impact groundwater with and without implementation of the BLM final rule.

Assumptions and Key Studies

- For purposes of the impact analysis for groundwater in this EIS/RMPA, 10,000 mg/L TDS is the water quality threshold for evaluating potential impacts on groundwater resources.
- The impacts analysis is based primarily on the impacts identified in CCST's 2014 report on well stimulation technologies, prepared to provide BLM with information to be used for "future planning, leasing, development decisions regarding oil and gas issues on the Federal mineral estate in California" (CCST, 2014, pg. 17).
- The impact analysis also considers information from recent studies conducted by the EPA (2015) and USGS (Taylor et al., 2014), as well as a recent proposal prepared for the State Water Resources Control Board by USGS (Taylor et al., 2014). In addition to these studies, this analysis incorporates information provided in the Final Environmental Impact Report, Analysis of Oil and Gas Well Stimulation Treatments in California, prepared in compliance with SB 4 (DOC, 2015).
- Data on oil and gas fields in the CCFO Planning Area were derived from unpublished data developed by DOGGR (see Appendix J in DOC, 2015) and DOGGR publications (DOC, 1998).

4.7.2 Impacts Common to All Alternatives

The following is a summary of impacts to groundwater resources that are common to all alternatives.

Groundwater Quantity

CCST indicates that in California, water use for hydraulic fracturing is less than in other states and is a fraction of statewide water use. Nonetheless, water use in California can impact local water supplies, especially during drought conditions (CCST, 2014, pg. 34). Although it is not possible to make specific determinations at this time as to where or when these kinds of impacts may occur, climate change could also affect water supply, such that water usage for well stimulation would exacerbate the impacts of climate change on groundwater quantity and water supply within the CCFO Planning Area. EPA notes that impacts related to water use are based on local water availability (EPA, 2015). CCST compiled water use data for 1,760 hydraulic fracturing events in California from FracFocus, Central Valley Regional Water Quality Control Board (CVRWQCB), South Coast Air Quality Management District (SCAQMD), and DOGGR's well stimulation disclosures from 2011 through June 2014. During that time period, water use per hydraulic fracturing treatment ranged from a minimum of 4,200 gallons (approximately 0.1 AF) per well to a maximum of 4,860,000 gallons (approximately 14.9 AF) per well, with an average use of 140,000 gallons (approximately 0.4 AF) (CCST, 2015a, pg. 121). CCST estimates that between 125 and 175 wells in California are hydraulically fractured per month (CCST, 2015a, pg. 149). Using the average water use of 140,000 gallons per well, statewide water use for hydraulic fracturing ranges from approximately 640 acre-feet per year (AFY) (assuming 125 wells per month) to approximately 900 AFY (assuming 175 wells per month). As described in Section 3.7.4, only one hydraulic fracturing event compiled by CCST (2015a, Appendix O) was conducted in the CCFO Planning Area. A well in the Guijarral Hills field, in Fresno County, was hydraulically fractured in December 2013 and 2,123,268 gallons of water was used (CCST, 2015a, Appendix O). CCST did not provide the water source, but the field is within portions of the Westside

subbasin (5-22.09) and Pleasant Valley subbasin (5-22.10), and therefore it is possible that groundwater from one of these subbasins was used.

Data provided by CCST are based on records for hydraulic fracturing treatments in California over the last few years. These conventional treatments typically involve a vertical well with only one to three stages of well stimulation treatments. Depending on advances in technology and future determination of favorable geologic conditions, future well stimulation may involve deep and long horizontal wells with up to 20 stages of well stimulation treatments for each well to reach unconventional oil reservoirs. Estimates of water use for these more water-intensive well stimulation treatments were developed for the SB 4 Final EIR (see Table 10.14-6, DOC, 2015). As summarized in the Final EIR, an upper estimate of water use for 20 stages of an exploratory well stimulation treatment may range from approximately 3,258,510 gallons to 6,517,020 gallons per well (10 AF to 20 AF). As described above, the one hydraulic fracturing treatment completed in the CCFO Planning Area within the last few years used approximately 2.1 million gallons of water (CCST, 2015a, Appendix O). Therefore, using these water use estimates for water-intensive well stimulation treatments is appropriate for the CCFO Planning Area.

Table 4.7-1. Water Use per Well for Drilling and Well Stimulation Treatments

Operations	Estimated Water Use per Well (AF)
Conventional well drilling operations[1]	0.39 – 0.77
Conventional well stimulation treatments[2]	0.40
Total Conventional Well Operations	**0.79 – 1.17**
Exploratory well drilling operations[1]	5 – 10
Water-intensive well stimulation treatments[1]	10 – 20
Total Water-Intensive Well Operations	**15 – 30**

1 - SB 4 Final EIR (see Table 10.14-6, DOC, 2015).
2 - CCST, 2015a, pg. 121.

Water is also used for drilling new wells. Exact amounts of water vary substantially with well design, depth, and location. Water use for drilling a typical oil well in California is approximately 4,200 gallons (approximately 0.1 AF) per day per well (Section 7.3.3, DOC, 2015). Although the number of days needed to drill and complete a well varies considerably, many of the existing fields with BLM mineral estate contain relatively shallow wells (less than 5,000 feet deep). Based on this depth, it is assumed that the drilling and completion process would take no more than 30 days to 60 days, resulting in a conservative estimated water use of 126,000 gallons (0.39 AF) to 252,000 gallons (0.77 AF). This amount may be substantially larger for an exploratory horizontal well; a high-end range for an exploratory well is estimated to be from about 1,600,000 gallons to 3,250,000 gallons (5 AF to 10 AF) (see Table 10.14-6, DOC, 2015).

Based on well stimulation notices filed through the middle of January 2014, CCST indicates that 96 percent (238 of 249) of the planned well stimulation treatments will use fresh water for hydraulic fracturing (CCST, 2014, pg. 186). Fresh water may be obtained from surface water or groundwater. The actual water source(s) (e.g., surface water or groundwater) to be used for drilling and well stimulation in the CCFO Planning Area is unknown and is likely to vary according to location. Consistent with a conservative approach, groundwater is assumed to be used for all drilling and well stimulation activities for the maximum of 37 wells in the 2015 RFD Scenario. Assuming groundwater use for both drilling and well stimulation, the estimated total water use per well for conventional wells (relatively shallow, vertical wells with a few stages of well stimulation) ranges from 0.79 AF to 1.17 AF, as shown in Table 4.7-1. The estimated total water use for water-intensive wells (deep horizontal wells with up to 20 stages of well stimulation) ranges from 15 AF to 30 AF per well.

To provide end members for a range of total water use for the RFD scenario, two assumptions regarding the number of conventional and water-intensive wells were considered. RFD Scenario 1 assumes that all 37 wells will be conventional vertical wells with well stimulation treatments involving one to three stages. For RFD Scenario 2, all 37 wells are assumed to be water-intensive horizontal wells with well stimulation treatments involving up to 20 stages. Using estimates per well on Table 4.7-1, total water use estimates for the two types of well stimulation operations are summarized in Table 4.7-2.

Assuming that all wells use groundwater, 37 conventional well operations would require an estimated 29 AF to 43 AF of groundwater (Table 4.7-2); 37 water-intensive well operations would require an estimated 555 AF to 1,110 AF of groundwater (Table 4.7-2). Water-intensive operations would use between approximately 19 to 26 times more water than conventional well operations. A combination of conventional and water-intensive wells would have a total groundwater use within this range. All of these estimates represent groundwater use over a time period of 15 to 20 years (as assumed in the RFD Scenario). Assuming a 20-year period, total groundwater use would range from 1.5 AFY to 55.5 AFY.

Table 4.7-2. Total Water Use Estimates for the RFD Scenario

RFD Scenario 1	Estimated Water Use per Well (AF)	Number of Wells[3]	Total Estimated Water Use (AF)
Conventional well operations[2]	0.79 – 1.17	37	29.23 – 43.29
Water-Intensive well operations[1]	15 – 30	0	0
Total water use, RFD Scenario 1[3]			29.23 – 43.29
RFD Scenario 2			
Conventional well operations[2]	0.79 – 1.17	0	0
Water-Intensive well operations[1]	15 – 30	37	555 – 1,110
Total water use, RFD Scenario 2[3]			555 – 1,110

1 - SB 4 Final EIR (see Table 10.14-6, DOC, 2015).
2 - CCST, 2015a, pg. 121.
3 - RFD Scenario (Except Alternative B, which has 32 wells; see discussion below).

For Alternative B, the number of wells is reduced slightly from 37 to 32, which also reduces the amount of water use estimated above. Applying a similar methodology as described above to 32 wells results in a total groundwater use ranging from 1.5 AFY to 48 AFY.

Potential impacts of groundwater withdrawals identified by CCST include decreases in river flows, land subsidence, reductions in aquifer storage, and increased pumping costs or the need to deepen or drill new wells (CCST, 2014, pg. 187). Water quantity impacts depend on local conditions, and therefore, require a site-specific analysis (CCST, 2014, pg. 187). Water demand for a well stimulation event occurs over a short period of time. Therefore, groundwater resources can be stressed if well stimulation occurs during the driest times of the year or if multiple well stimulation jobs are being conducted at the same time in the same geographic area. The volumes of water are often less important than the rates and timing of the withdrawals. An impact analysis of groundwater quantity in the Final EIR for SB 4 noted that many groundwater basins had already been critically impacted according to rankings by CDWR, including basins/subbasins with overdraft conditions. As noted in the Final EIR, any increase in groundwater use in a basin/subbasin in overdraft would contribute to overdraft conditions, a process considered to be a substantial impact if not mitigated.

Although all of these potential impacts are applicable to groundwater resources in the CCFO Planning Area, the details of the RFD Scenario indicate that the maximum amount of groundwater use would be 1,110 AF (361,696,830 gallons) for the 37 wells. Compared to the resources present in any of the groundwater basins, this small amount would not likely result in any discernable impact. Whether any impacts to groundwater quantity could occur would depend on site-specific conditions that cannot be quantified at this time. Nonetheless, the potential for groundwater quantity impacts is common to all five alternatives.

Groundwater Quality

CCST identified over 300 chemicals or chemical mixtures used for hydraulic fracturing in California (CCST, 2015b, pg. 70). The chemical additives used in well stimulation activities can include the same or similar type of additives used in water- and steam-flooding enhanced recovery operations which are applied in volumes higher than in well stimulation (Taylor et al., 2014). The environmental toxicity of approximately two-thirds of these chemicals is unknown because of a lack of publicly available information (CCST, 2015b, pg. 162). Thirty-three of the chemicals were found to be hazardous to aquatic species and could pose a threat to the environment if released (CCST, 2015b, pg. 162). Many of the chemicals are equivalent to the toxicity of household products, which is not insignificant, and numerous chemicals are non-toxic (CCST, 2014, pg. 194). However, CCST is clear that a more complete assessment of the hazards associated with well stimulation fluids in California is necessary (CCST, 2014, pg. 193; CCST, 2015b, pages 153-166). CCST notes that their analysis is limited and full disclosure of the chemicals used during hydraulic fracturing is required in order to understand the potential environmental quality impacts (CCST, 2014, pg. 194; CCST, 2015b, pg. 162).

CCST also compared chemicals associated with well stimulation fluids used in California with those used in other parts of the country and concluded that the composition of fluids used in California were significantly different. This difference was attributed to the prevalence of gel-based fluids in California that require smaller amounts of water but also contain higher concentrations of chemicals. Given that most of the hydraulic fracturing in California occurs in relatively shallow wells, this often results in fluids with concentrated chemicals being used in close vertical proximity (less than 2,000 feet) to usable groundwater (CCST, 2014, pages 219-220).

CCST notes that the chemical constituents of produced water from stimulated wells in California has not been studied (CCST, 2015b, pg. 163). However, starting in July 2015, operators are required to sample produced water initially following well stimulation and then again after 30 days of production (CCST, 2015b, pg. 91) Therefore, produced water quality from stimulated wells will be better understood in the future.

It is understood that produced water reflects the water quality of the formation (CCST, 2015b, pg. 97). Oil and gas formations can contain methane, salts, trace metals, naturally occurring radioactive materials (NORM), and organic materials that can return to the surface with flowback and produced waters. TDS concentrations of flowback and produced water in California from well stimulation operations may be lower than in other regions because well depths are shallower than in other parts of the United States (CCST, 2014, pg. 205). Trace metals concentrations in the Monterey Formation are high, and therefore flowback and produced waters in California are expected to have higher than average trace metal concentrations (CCST, 2014, pg. 205). CCST notes that there is a lack of data on NORM content in flowback and produced water in California and regards this as a major data gap in evaluating impacts from well stimulation treatments (CCST, 2014, pg. 207). It is known that elements such as uranium, radium, and radon gas are present at low concentrations in soil and groundwater. The Monterey Formation is six times more enriched in uranium than the World Shale Average; however, the uranium content of crude oil in California is not "typically high" (CCST, 2014, pg. 206). No information about organic constituents in flowback and produced water from well stimulation treatments was identified by CCST. However, organic constituents in produced water from conventional oil and gas operations typically include polycyclic aromatic hydrocarbons (PAHs), phenols, and volatile organic compounds (VOCs) such as BTEX and naphthalene (CCST, 2014, pg. 207).

Notwithstanding these limitations and data gaps, the chemical composition of flowback (and associated formation fluids) indicates that groundwater quality could be impacted if these fluids were released or migrated into usable groundwater. This is evidenced by constituents with concentrations above drinking water standards or the presence of other constituents (e.g., methane or salts) that could degrade groundwater

quality. The impact analysis focuses on potential pathways for these fluids to reach usable groundwater as described below.

Potential Release Pathways

Potential release pathways include both surface and subsurface releases.

Surface spills and leaks can occur during the transport of chemicals, during pre-stimulation chemical mixing, or during well stimulation treatment (CCST, 2014, pg. 210). These releases can be caused by a number of mechanisms, including tank ruptures, piping failures, blowouts, equipment failures, overfills, fires, vandalism, accidents or improper operations (CCST, 2014, pg. 210). Based on spill data from Pennsylvania and Colorado, the EPA estimates that 100 to 3,700 surface spills could occur annually in the United States, under the assumption that 25,000 to 30,000 wells are hydraulically fractured each year (EPA, 2015).

The storage and disposal of flowback and produced water at the surface can also result in accidental surface releases to the environment. Between January 2009 and February 2014, there were over 400 reported surface spills at oil and gas fields in California caused primarily by tank corrosion and sensor failures which released close to 3 million gallons of flowback/produced water (CCST, 2014, pg. 211). There is also evidence that the disposal of flowback and/or produced water in unlined pits has led to groundwater impacts in the United States and in California (CCST, 2015b, pg. 112). As of April 2015, there were 933 unlined pits identified in California, 62 percent of which were active (CCST, 2015b, pg. 110). Approximately one-third of the active pits were operating without appropriate permits from the Central Valley Regional Water Quality Control Board (CVRWQCB) (CCST, 2015b, pg. 110). Illegal discharges have occurred as illustrated by the $60,000 fine issued by the CVRWQCB to Vintage Production California LLC for discharging saline water, formation fluids, and hydraulic fracturing fluids into an unlined sump for 12 days (CCST, 2014, pg. 215).

Section 3162.3-3(2)(h) of the BLM final rule on hydraulic fracturing requires that all flowback be stored in rigid enclosed, covered, or netted and screened aboveground tanks unless the applicant demonstrates that the use of these tanks is infeasible for environmental, public health or safety reasons. In this case, the applicant could use lined pits under certain conditions including a distance of 50 feet from usable groundwater. Section 1786 of the SB 4 Well Stimulation Treatment Regulations prohibits the disposal of flowback water to sumps or pits in California and requires that flowback water be stored in containers. Therefore, both SB 4 and the BLM final rule require storage of flowback in containers. However, the BLM final rule is more stringent than the SB 4 regulations, because it requires that the containers be enclosed. The potential for a surface release of flowback to occur is greater if the container is not enclosed. Although the BLM final rule requires a closed container, which is a more protective container than required under SB 4, SB 4 requires secondary containment and mitigation that would reduce any impacts from surface spills. Section 1786 of the SB 4 Well Stimulation Treatment Regulations also requires that operators be in compliance with all applicable testing, inspection, and maintenance requirements for production facilities that are storing and handling well stimulation fluids.

Another potential surface release mechanism is the reuse of produced water for irrigated agriculture. Although this has not been conducted within the CCFO Planning Area, there is growing interest in this practice. Produced water from five oil and gas fields in the San Joaquin Valley (Deer Creek, Jasmin, Kern River, Kern Front, and Mount Poso), two of which have undergone hydraulic fracturing (Kern River and Mount Poso), have been used to irrigate crops. The potential reuse of produced water from well stimulation is problematic because of the chemicals in well stimulation fluid that are known to be toxic in addition to those chemicals whose toxicity is unknown (CCST, 2015b, pg. 114).

CCST identifies potential subsurface pathways for well stimulation fluids. One potential subsurface pathway is that well stimulation may create a fracture that connects to a higher permeable zone or to existing

faults or abandoned wells (CCST, 2014, pg. 217; CCST, 2015b, pg. 117) that would allow for migration of well stimulation fluid. CCST (2014, pg. 219; and 2015b, pg. 121) notes a study that suggests a minimum separation of 2,000 feet is recommended between shale reservoirs and overlying groundwater resources. In California, however, many wells undergoing well stimulation are less than 2,000 feet deep. CCST, therefore, concludes that the potential for induced fractures to reach groundwater aquifers may be higher in California than in other states (CCST, 2014, pg. 220). Nationwide, the EPA indicates that 20 percent of the 23,000 wells hydraulically fractured in 2009 and 2010 had less than a 2,000-foot separation between the point of shallowest hydraulic fracturing and protected water (EPA, 2015).

The BLM final rule and the SB 4 regulations both require an analysis of suspected faults prior to well stimulation to identify and analyze any potential for hydraulic fracturing fluid to migrate outside of the zone being fractured. The BLM final rule requires a map of suspected faults or fractures within 0.5-mile of the wellbore. SB 4 regulations require a review of all geologic features, including known faults that are active or inactive, within five times the axial dimensional stimulation area (ADSA)[1]. If the ADSA is less than 0.1-mile (528 feet), which is often the case in California, then the geologic review would be less than 0.5-mile, and risks to groundwater from fluid migration to existing fractures may be greater if the BLM final rule were overturned.

Another potential subsurface pathway for well stimulation fluids is migration in the well or well annuli between the casing and the formation. Failure of cement and casing strings may allow pressurized gas and fluids from the producing zones to migrate upwards along the well and into usable groundwater. Poor well construction and uncemented casing are cited as the most important mechanisms leading to gas and fluid migration (CCST, 2014, pg. 224). The USGS summaries of published scientific work (Taylor et al., 2014) highlights this conclusion. Additionally, the USGS notes that the pathways by which fluids associated with well stimulation practices can affect potentially usable groundwater can be the same as those by which all oil and gas operations, including enhanced oil recovery practices, can have effects (Taylor et al., 2014). The USGS notes that published research has identified leaky wellbores as the most common pathway for contaminants from oil and gas activities to migrate to groundwater resources (Taylor et al., 2014). The USGS further notes that of the 168 active oil and gas fields in California greater than two square miles in size, 31 contain more than 100 wellbores per square mile (Taylor et al., 2014). A large number of potential contaminant pathways would exist if only a small percentage of wellbores were compromised (Taylor et al., 2014). In fact, over one million wells may have been drilled in the United States before well construction was regulated; the status and location of many of these wells are unknown (EPA, 2015). The EPA estimates that 6 percent of 23,000 oil and gas wells across the U.S. were drilled more than 10 years before they were hydraulically fractured in 2009 and 2010, and that these older wells may not have been constructed to withstand the stresses associated with hydraulic fracturing (EPA, 2015). The EPA goes further to note that using older wells for hydraulic fracturing "could be of concern" (EPA, 2015).

Abandoned wells are a potential subsurface pathway for well stimulation fluids. CCST (2015b, pg. 122) indicates that there are more inactive wells in California than active wells. Based on data from DOGGR, there are approximately 221,000 wells in California, approximately 116,000 (52 percent) of which have been abandoned according to State standards (CCST, 2015b, pg. 122). There are 1,800 wells that were not abandoned properly and whose location is approximate and 388 wells whose status is unknown because they were constructed before 1976 (CCST, 2015b, pg. 122). SB 4 requires operators to locate abandoned wells, but does not require operators to test the condition of the abandoned wells. CCST describes a U.S. Government Accountability Office (GAO) report conducted in 1989 about Class II injection wells across the country in which cases of groundwater contamination were caused by the communication between the

[1] ADSA refers to the Axial Dimensional Stimulation Area and is defined in SB 4 as the estimated axial dimensions, expressed as maximum length, width, height, and azimuth, of the area(s) stimulated by a well stimulation treatment (14 CCR, Chapter 4, Section 1781(f)).

injection well and improperly abandoned wells. GAO indicates that 70 percent of injection wells were constructed before 1976, when permitting requirements began to require a search for abandoned wells within one quarter mile of a newly proposed injection well bore (CCST, 2014, pg. 225). Wells constructed before 1976 were grandfathered into the program without requiring knowledge of nearby abandoned wells. To convert a formerly oil producing well into an injection well, the BLM would approve a Sundry Form 3160-5. In California, most of the disposal of flowback fluids occurs in Class II injection wells that inject fluids back into the hydrocarbon zones for enhanced oil recovery (EOR).

Despite the increased focus on well stimulation by the scientific research community within the last few years, the CCST reports state that the scientific understanding of well stimulation impacts is not currently well established (CCST, 2014, pg. 231; CCST, 2015b; pages 166-167). CCST (2015b, pg. 167) states that there is not enough data to either confirm or deny that surface and groundwater resources have been impacted by well stimulation. The EPA notes that the evaluation of potential impacts is inhibited by the lack of water quality data before and after a well is hydraulically fractured, lack of long-term studies, presence of other sources of contamination which make proving a direct link to hydraulic fracturing difficult, and lack of information on hydraulic fracturing activities (EPA, 2015).

The SB 4 Final EIR (DOC, 2015) focused on potential subsurface pathways along wells or wellbores, including the well subject to well stimulation and other existing wells/wellbores within the zone of influence (generally referred to in SB 4 regulations as the ADSA). These wells or wellbores, if not effectively sealed, could potentially serve as a conduit for upward migration of well stimulation fluids (including gas) into usable groundwater. Specifically, the analysis noted that wells in oil and gas fields are drilled through groundwater resources that may overlie the hydrocarbon zones, and, as such, provide a continuous physical connection between well stimulation target zones and usable groundwater. If a pathway from the target zone to usable groundwater is completed along a wellbore, fluid travel times and volumes are not restricted by confining layers in the same manner as would occur naturally in the absence of the wellbore.

Both the BLM final rule and the SB 4 regulations have requirements for well seals to prevent the migration of gas and fluids from the produced zone to usable groundwater. The BLM final rule requires that at least a 200-foot well seal be placed between the hydraulic fracturing zone and the deepest usable water. The SB 4 regulations require cement placement in surface casing from the base of the casing to the surface and preferably through the freshwater zone (3,000 mg/L). The State's Final EIR (DOC, 2015) includes a mitigation measure (MM-GW-4b) requiring a 500-foot well seal across the base of usable water if the hydraulic fracturing zone is below the base of the usable water. If the hydraulic fracturing zone is within usable water, then this mitigation measure requires a well seal along the entire casing string, from the bottom of the well to the surface. Therefore, the SB 4 regulations along with the Final EIR mitigation measures are more protective than the BLM final rule. Consequently, if the BLM final rule is overturned, groundwater impacts from the migration of gas or fluids from producing zone to usable water would be protected.

Based on the material provided in these collective analyses and the number of wells in most oil and gas fields, wells appear to represent the most probable potential subsurface pathway for well stimulation liquids and gases to reach protected groundwater. Further, the primary factor affecting the well-related pathway is the mechanical integrity of the well, and in particular, the placement and effectiveness of cement seals in the annulus between the well casing and the geologic formation.

Potential impacts to usable groundwater quality associated with migration of well stimulation fluids and formation fluids (including gas) along surface and subsurface pathways are applicable to all alternatives associated with the RMP/EIS.

Impacts Mitigated by Recent Regulations

Numerous recent regulations regarding well stimulation and hydraulic fracturing address these potential impacts and, at least in part, serve to mitigate the impacts discussed above on groundwater quantity and quality. Regulations include both California regulations for well stimulation treatment permits and the final rule for hydraulic fracturing on Federal and Indian lands (BLM, 2015). However, as noted above, the BLM will be unable to enforce their final rule until a final decision is made in a legal challenge.

State regulations include the Well Stimulation Treatment Regulations adopted by DOGGR in July 2015 in compliance with SB 4. These regulations contain numerous protective measures for groundwater quality based on isolating the well stimulation target zone from groundwater resources. A summary of the key protective measures in the regulations was provided in the Final EIR (DOC, 2015, see Section 10.14.5 Impact Analysis and Mitigation Measures for Groundwater Resources). Also included in the Final EIR were mitigation measures to work in combination with SB 4 regulations to mitigate potential impacts to both groundwater quantity and groundwater quality on a programmatic basis. The proposed mitigation measures — along with the permanent SB 4 regulations — are considered to mitigate potential impacts to groundwater from well stimulation treatments.

In addition, SB 4 requires groundwater monitoring to track the performance of the regulations and mitigation in protecting groundwater resources. Model Criteria for groundwater monitoring in areas of oil and gas stimulation were finalized in July 2015. These Model Criteria were used to implement a regional groundwater monitoring program which began in January 2016.

The BLM final rule contains numerous protective measures that address groundwater impacts from hydraulic fracturing. Many of these measures are complementary or duplicative of requirements in the SB 4 regulations (e.g., requirements for mechanical integrity testing of wells). However, as discussed previously, there are some measures that are more stringent than SB 4 regulations. In addition, the rule includes a performance standard requiring "the operator to isolate all usable water and mineral-bearing formations and protect them from contamination" (Section 3162.5-2). The final rule stipulates data and information required for approval of hydraulic fracturing, requires monitoring and verification of cementing operations prior to hydraulic fracturing, provides details of mandatory mechanical integrity testing prior to hydraulic fracturing, requires monitoring and recording of pressure on well annuli during stimulation, contains requirements for a water disposal plan and management of recovered fluids, and lists information that must be provided after the hydraulic fracturing has been completed.

Collectively, the DOGGR regulations, mitigation measures provided in the Final EIR, and the BLM final rule serve to reduce potential impacts to the quantity or quality of usable groundwater. However, if the BLM final rule is overturned, then the risk of impacts to groundwater resources may increase because the BLM final rule has more stringent requirements for the storage of flowback and the evaluation of faults prior to well stimulation. The regulations are applicable to all alternatives associated with the RMP/EIS.

4.7.3 Impacts of Alternative A (No Action)

Under Alternative A, the No Action Alternative, the areas currently open for oil and gas leasing would remain open and the areas closed under the 2007 RMP would remain closed. Areas that remain closed include designated wilderness, wilderness study areas (WSAs), Fort Ord National Monument, and Clear Creek Serpentine Area of Critical Environmental Concern (ACEC). Figure 4.7-1 illustrates the Federal mineral estate that is open, open with no surface occupancy (NSO) restrictions, and closed to oil and gas leasing under Alternative A.

Groundwater basins on Federal mineral estate that is open and open with NSO restrictions can potentially be impacted under this alternative. Federal mineral estate that is open with NSO restrictions can be impacted by directional or horizontal drilling from nearby surface lands.

As shown on Table 4.7-3, portions of all 20 groundwater basins containing Federal mineral estate are open to oil and gas leasing in Alternative A. These groundwater basins are in seven counties within the CCFO Planning Area: Alameda, Contra Costa, Fresno, Merced, Monterey, San Benito, and Santa Cruz. As summarized on Table 4.7-3, four of these groundwater basins/subbasins were assigned a high CASGEM priority ranking and are on the List of Critically Overdrafted Groundwater Basins, released January 2016: Delta-Mendota (5-22.07), Westside (5-22.09), Paso Robles (3-4.06), and Pajaro Valley (3-2). A description of each of the groundwater basins is provided in Section 3.7.4. As described in the 2015 RFD Scenario, up to 37 oil and gas wells will be drilled in the next 15 to 20 years, 32 of which are expected to be within existing oil and gas fields and 3 to 5 outside of existing oil and gas fields. As summarized in Table 4.7-3, oil and gas fields intersect groundwater basins in Contra Costa, Fresno, Monterey, and San Benito Counties.

All of the impacts associated with groundwater quantity and quality described in Section 4.7.2 are applicable to Alternative A. In addition, no new impacts to usable groundwater are identified that are specific only to this alternative. However, the four critically overdrafted groundwater basins/subbasins assigned a high CASGEM priority ranking that contain open Federal mineral estate under this alternative would be particularly vulnerable to groundwater quality and quantity impacts. Alternative A is the only alternative that has open mineral estate in all 20 groundwater basins with Federal mineral estate, including the four high-priority and critically overdrafted basins.

Mitigation

All of the mitigation measures discussed in Section 4.7.2 are applicable to Alternative A. No additional mitigation measures are necessary to mitigate impacts associated with this alternative. Collectively, existing regulations in the BLM final rule for hydraulic fracturing on Federal and Indian lands if not overturned (March 2015), the DOGGR SB 4 permanent regulations, and the mitigation measures in the SB 4 Final EIR (DOC, 2015) mitigate the potential impacts to quantity and quality of usable groundwater in the CCFO Planning Area.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, the leases subject to the settlement agreement would be open to leasing and would be issued. As discussed in Section 3.7.4, some of the leases overlie small portions of two groundwater basins — the Salinas Valley, Paso Robles Area groundwater subbasin (3-4.06) in Monterey County and the Vallecitos Creek Valley groundwater basin (5-71) in San Benito County. The Paso Robles Area groundwater basin is assigned a high-priority ranking in the CASGEM program and would be particularly vulnerable to groundwater quality and quantity impacts.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.7.4 Impacts of Alternative B

Under Alternative B, Federal mineral estate within the boundaries of oil and gas fields, plus the DOGGR 0.5-mile buffer, would be open for oil and gas leasing and the remaining areas would be closed. Controlled surface use (CSU) stipulations would apply to all land open to oil and gas leasing. Figure 4.7-2 illustrates the Federal mineral estate that are open, open with no surface occupancy (NSO) restrictions, and closed to oil and gas leasing under Alternative B.

Table 4.7-3. Groundwater Basins with Federal Mineral Estate Associated with Each Alternative

DWR Groundwater Basin / Subbasin				CDWR Priority Ranking[2]	Alternatives: Groundwater Basins that Contain Open Federal Mineral Estate[3]				
Basin Name	Subbasin Name	Number	County[1]		A	B	C	D	E
Santa Clara Valley	Niles Cone	2-9.01	Alameda	medium	X	—	—	—	—
Clayton Valley	—	2-5	Contra Costa	very low	X	X	X	—	—
San Joaquin Valley	Tracy	5-22.15		medium	X	X	X	—	—
San Joaquin Valley	Delta-Mendota	5-22.07	Fresno	high*	X	—	X	X	—
	Pleasant Valley	5-22.10		low	X	X	X	X	—
	Westside	5-22.09		high*	X	X	X	X	—
Cholame Valley	—	3-5	Monterey	very low	X	—	X	—	—
Lockwood Valley	—	3-6		very low	X	—	X	—	—
Peach Tree Valley	—	3-32		very low	X	—	—	—	—
Salinas Valley	Forebay Aquifer	3-4.04		medium	X	X	X	X	—
	Upper Valley Aquifer	3-4.05		medium	X	—	X	—	—
	Paso Robles Area	3-4.06		high*	X	—	X	X	—
Bitterwater Valley	—	3-30	San Benito	very low	X	—	X	—	—
San Benito River Valley	—	3-28		very low	X	—	—	—	—
Gilroy–Hollister Valley	San Juan Bautista Area	3-3.04		medium	X	—	X	—	—
Hernandez Valley	—	3-31		very low	X	—	—	X	—
Panoche Valley	—	5-23		very low	X	—	X	X	—
Vallecitos Creek Valley	—	5-71		very low	X	X	X	X	—
Santa Cruz Purisima Formation	—	3-21	Santa Cruz	medium	X	—	—	—	—
Pajaro Valley	—	3-2		high*	X	—	—	—	—

1 - No groundwater basins with Federal mineral estate in San Francisco, San Joaquin, San Mateo, Santa Clara, or Stanislaus Counties.
2 - As part of the CASGEM basin prioritization process.
3 - Also includes Federal mineral estate that is Open with Restrictions (No Surface Occupancy).
*On Draft List of Critically Overdrafted Groundwater Basins.

Approximately 96 percent of the Federal mineral estate is closed to oil and gas leasing under Alternative B. Up to 32 development wells are expected to be drilled in the next 15 to 20 years under Alternative B. Well drilling will be conducted within the boundaries and buffer of existing oil and gas fields. Because water-intensive wells could also be drilled within an oil and gas field, no changes are made for assumptions on water use per well for potential impacts to groundwater quantity. As shown in Table 4.7-3, 6 of the 20 groundwater basins that intersect Federal mineral estate are open to oil and gas leasing. These groundwater basins are in four counties: Contra Costa, Fresno, Monterey, and San Benito. As summarized on Table 4.7-3, Westside subbasin is the only groundwater basin with open Federal mineral estate that has a high-priority ranking under the CASGEM program. This subbasin would be particularly vulnerable to groundwater quality and quantity impacts under this alternative. However, Alternative B involves fewer groundwater basins than any other alternative except Alternative E. Further, of the six basins involved, only three are associated with either a medium- or high-priority ranking under the CASGEM program. A description of each of the groundwater basins is provided in Section 3.7.4.

All of the impacts associated with groundwater quantity and quality described in Section 4.7.2 are applicable to Alternative B. In addition, no new impacts to usable groundwater are identified that are specific only to this alternative.

Mitigation

All of the mitigation measures discussed in Section 4.7.2 are applicable to Alternative B. No additional mitigation measures are necessary to mitigate impacts associated with this alternative. Collectively, existing regulations in the BLM final rule for hydraulic fracturing on Federal and Indian lands if upheld by the court, (March 2015), the DOGGR SB 4 permanent regulations, and the mitigation measures in the SB 4 Final EIR (DOC, 2015) mitigate the potential impacts to quantity and quality of usable groundwater in the CCFO Planning Area.

Leases Subject to Settlement Agreement

Under Alternative B, only a small portion of the leases subject to the settlement agreement would be open to oil and gas leasing. The leases subject to the settlement agreement in Monterey County would not overlie oil and gas fields, and therefore, would be closed to oil and gas leasing under this alternative. In San Benito County, the leases that are within or overlap portions of the Vallecitos oil and gas field would be open to oil and gas leasing. Portions of these open leases intersect the Vallecitos Creek Valley groundwater basin (5-71).

4.7.5 Impacts of Alternative C

Under Alternative C, Federal mineral estate in high oil and gas potential areas or within the boundaries and 0.5-mile buffer of oil and gas fields would be open to oil and gas leasing, with the exception of core population areas of the giant kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills which are closed to leasing. Areas closed under the 2007 RMP would remain closed. CSU stipulations would apply to all land open to oil and gas leasing. NSO stipulations would apply to some lands open to leasing, including: (1) threatened and endangered species critical habitat; (2) BLM developed recreation and administrative sites; and (3) special status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, and scenic designations). Figure 4.7-3 illustrates the Federal mineral estate that are open, open with NSO restrictions, and closed to oil and gas leasing under Alternative C.

Slightly more than half (54 percent) of the Federal estate is open to oil and gas leasing. Under Alternative C, up to 37 wells projected to be drilled in the next 15 to 20 years will be drilled in areas of high oil and gas potential or with the boundaries and buffer of oil and gas fields.

As shown on Table 4.7-3, 14 of the 20 groundwater basins that contain Federal mineral estate in the CCFO are subject to oil and gas leasing. These groundwater basins are in Contra Costa, Fresno, Merced, Monterey, and San Benito Counties. As summarized on Table 4.7-3, there are three groundwater subbasins with

open Federal mineral estate that have a high-priority ranking from the CASGEM program: Delta-Mendota (5-22.07), Westside (5-22.09), and Paso Robles (3-4.06). These subbasins would be particularly vulnerable to groundwater quality and quantity impacts under this alternative. A description of each of the groundwater basins is provided in Section 3.7.4. Alternative C involves fewer groundwater basins than Alternative A but more than Alternative B.

All of the impacts associated with groundwater quantity and quality described in Section 4.7.2 are applicable to Alternative C. In addition, no new impacts to usable groundwater are identified that are specific only to this alternative.

Mitigation

All of the mitigation measures discussed in Section 4.7.2 are applicable to Alternative C. No additional mitigation measures are necessary to mitigate impacts associated with this alternative. Collectively, existing regulations in the BLM's final rule for hydraulic fracturing on Federal and Indian lands if upheld by the court (March 2015), the DOGGR SB 4 regulations, and the mitigation measures in the SB 4 Final EIR (DOC, 2015) mitigate the potential impacts to quantity and quality of usable groundwater in the CCFO Planning Area.

Leases Subject to Settlement Agreement

Under Alternative C, most of the leases subject to the settlement agreement would be open to oil and gas leasing because of the occurrence of leases within high oil and gas potential areas. The leases subject to the settlement agreement in San Benito County would be, for the most part, either within the Vallecitos oil and gas field or within high oil and gas potential areas, and therefore would be open for oil and gas leasing. A corner of one of the leases, however, is outside of the high oil and gas potential area and this portion, therefore, would be closed to oil and gas leasing. Small portions of the open leases intersect the Vallecitos Creek Valley groundwater basin (5-71) in San Benito County or the Salinas Valley, Paso Robles Area subbasin (3-4.06) in Monterey County. The Paso Robles Area groundwater basin was assigned a high CASGEM priority ranking and would be particularly vulnerable to groundwater quality and quantity impacts.

4.7.6 Impacts of Alternative D

Under Alternative D, Federal mineral estate underlying BLM surface estate would be open for oil and gas leasing, while BLM split estate lands and Ciervo Panoche Natural Area would be closed. Areas closed under the 2007 RMP would remain closed. CSU stipulations would apply to all land open to oil and gas leasing. NSO stipulations would apply to ACEC and Recreation and Public Purpose (R&PP) lands. Figure 4.7-4 illustrates the Federal mineral estate that are open, open with NSO restrictions, and closed to oil and gas leasing under Alternative D.

Approximately 15 percent of the Federal mineral estate in the CCFO Planning Area would be open to oil and gas leasing under this alternative. As shown on Table 4.7-3, 8 of the 20 groundwater basins that intersect Federal mineral estate in the CCFO study area would be open to oil and gas leasing. These groundwater basins are in Fresno, Merced, Monterey, and San Benito Counties. As summarized on Table 4.7-3, there are three groundwater subbasins assigned a high CASGEM priority ranking that intersect open Federal mineral estate: Delta-Mendota (5-22.07), Westside (5-22.09), and Paso Robles (3-4.06). These subbasins would be particularly vulnerable to groundwater quality and quantity impacts under this alternative. A description of each groundwater basin is provided in Section 3.7.4. Alternative D involves the same number of groundwater basins as Alternative C, fewer groundwater basins than Alternative A, and more than Alternative B.

All of the impacts associated with groundwater quantity and quality described in Section 4.7.2 are applicable to Alternative C. In addition, no new impacts to usable groundwater are identified that are specific only to this alternative.

Mitigation

All of the mitigation measures discussed in Section 4.7.2 are applicable to Alternative D. No additional mitigation measures are necessary to mitigate impacts associated with this alternative. Collectively, existing regulations in the BLM final rule for hydraulic fracturing on Federal and Indian lands if not overturned (March 2015), the DOGGR SB 4 regulations, and the mitigation measures in the SB 4 Final EIR (DOC, 2015) mitigate the potential impacts to quantity and quality of usable groundwater in the CCFO Planning Area.

Leases Subject to Settlement Agreement

Under Alternative D, most of the leases subject to the settlement agreement in both Monterey and San Benito Counties would be closed, but some would be open. In Monterey County, none of the open leases intersect groundwater basins. In San Benito County, portions of some of the leases intersect the Vallecitos Creek Valley groundwater basin (5-71). As summarized on Table 4.7-3, oil and gas fields intersect groundwater basins on open Federal mineral estate in Fresno, Monterey, and San Benito Counties.

4.7.7 Impacts of Alternative E

Under Alternative E, Federal mineral estate outside of groundwater basins would be open for oil and gas leasing, while Federal mineral estate within groundwater basins would be closed. Areas closed under the 2007 RMP would remain closed. CSU stipulations would apply to all land open to oil and gas leasing. NSO stipulations would apply to some open lands: (1) 12-digit Hydrologic Unit Codes (HUCs) intersecting EPA impaired, perennial surface waters; (2) 12-digit HUCs intersecting non-impaired, perennial surface waters that intersect split estate; (3) 12-digit HUC subwatersheds with the highest aquatic intactness score; (4) 0.25 miles from non-impaired perennial surface waters; and (5) 0.25 miles from eligible Wild and Scenic Rivers. Figure 4.7-5 illustrates the Federal mineral estate that are open, open with NSO restrictions, and closed to oil and gas leasing under Alternative E.

Approximately 88 percent of the Federal mineral estate in the Central Coast Field Office study area would be open to oil and gas leasing under this alternative. By definition of the alternative, none of the open Federal mineral estate would intersect groundwater basins. Future well drilling would occur outside of groundwater basins.

All of the impacts associated with groundwater quantity and quality described in Section 4.7.2 are applicable to Alternative E, and no new impacts have been identified. However, the potential impacts to groundwater resources are considered to be less for wells outside of a groundwater basin. It is recognized that the risk is not completely eliminated because these areas may provide surface and subsurface recharge into an adjacent groundwater basin. Usable groundwater with beneficial uses can also exist outside of the designated groundwater basins. Nonetheless, the potential for impacts is considered higher for activities within a groundwater basin, making this alternative the most protective alternative for groundwater resources.

Mitigation

All of the mitigation measures discussed in Section 4.7.2 are applicable to Alternative E. No additional mitigation measures are necessary to mitigate impacts associated with this alternative. Collectively, existing regulations in the BLM final rule for hydraulic fracturing on Federal and Indian lands if not overturned (March 2015), the DOGGR SB 4 regulations, and the mitigation measures in the SB 4 Final EIR (DOC, 2015) mitigate the potential impacts to quantity and quality of usable groundwater in the CCFO Planning Area.

Leases Subject to Settlement Agreement

Under Alternative E, the portions of the leases subject to the settlement agreement that do not intersect groundwater basins are open to oil and gas leasing. Therefore, most of the leases in both Monterey and San Benito Counties are open to oil and gas leasing. Portions of the open leases intersect the Vallecitos oil and gas field in San Benito County. However, portions that overlie the groundwater basin are excluded.

4.8 Surface Water Resources

This section describes surface water impacts of the five alternatives. The section begins with a description of impacts common to all alternatives. All alternatives would involve the development of oil wells under the 2015 RFD Scenario. The primary differences between alternatives are the areas open to oil development, and the locations of these areas. The description of specific impacts for each alternative indicates where the impacts are most likely to occur.

4.8.1 Introduction

Approach to Impact Assessment

All of the alternatives would involve the development of the 2015 RFD Scenario. For all but Alternative B, up to 37 exploratory and development wells would be developed within the Federal mineral estate lands, with the potential for the use of well stimulation and enhanced oil recovery techniques. Alternative B has an RFD Scenario of up to 32 wells.

As a result of ground disturbance associated with the development of new production facilities and associated access and infrastructure, construction-related impacts could occur to surface water quality, sediment and erosion, flooding and water supply. Post-construction operation and production activities could also impact surface water quality, sediment and erosion, flooding, and water supply.

Areas subject to NSO stipulations are assumed to generate no surface water impacts except as may occur from subsurface use, covered in Section 4.7, Groundwater Resources. NSO restrictions are intended to minimize or eliminate adverse effects on unique or significant natural resources that are incompatible with fluid mineral development. No new surface disturbing activity is allowed unless the action is determined to not impair the values present.

Relevant management actions to protect surface water resources in the 2007 RMP include:

- **SOIL-COM1.** Require an approved erosion control strategy and topsoil segregation/restoration plan for proposals involving surface disturbance on slopes of 20 to 40 percent. Such construction must be properly surveyed and designed by a certified engineer and approved by the BLM before construction and maintenance. No surface disturbance on slopes greater than 40 percent would be allowed unless it is determined that it would cause a greater impact to pursue other alternatives.
- **SOIL-COM2.** Require a topsoil segregation/restoration plan be submitted to and approved by the BLM before construction and maintenance actions that would disturb the surface of soils considered to have poor topsoil suitability or restoration potential.
- **SOIL-COM3.** Close roads and trails to public use during periods of extreme wet weather in areas where sustained public use may compromise the integrity of the road or trail surface.
- **SOIL-COM4.** Implement soil loss assessment procedures for road and trail maintenance.
- **SOIL-COM5.** Implement best management practices (BMPs) for non-point source pollution control.
- **WAT-COM1.** Implement BMPs at the activity-plan or project level to prevent degradation of water quality.
- **WAT-COM2.** Maintain existing developed water sources (i.e., spring developments and reservoirs). Develop new sources on a case-by-case basis through project-level planning.
- **WAT-COM3.** Maintain adjudicated water rights; inventory water sources not adjudicated or water rights sought, where applicable.

- **WAT-COM4.** Manage CWA 303(d)-listed impaired water bodies to meet properly functioning condition (PFC) objectives relative to beneficial uses and total maximum daily loads (TMDLs).
- **WAT-COM5.** Maintain stable watershed conditions and implement passive and active restoration projects to protect beneficial uses of water and meet TMDLs.
- **WAT-COM6.** Work with Regional Water Quality Control Boards, Coordinated Resource Management Planning groups, and other private landowners or non-profit organizations to prioritize watershed improvement projects and establish monitoring programs to prevent water bodies from reaching impairment levels that would result in listing under CWA 303(d).
- **WAT-COM7.** Limit authorized uses and management activities to those that do not cause irreversible, irreparable impacts to water quality and watershed function.
- **WAT-COM8.** Periodically monitor water quality in seasonal pools and perennial ponds containing known or suspected threatened and endangered (T & E) species. Identify water quality issues and initiate repairs, within environmental constraints.
- **WAT-B2.** Submit request to the California State Department of Water Resources to establish Federal water reserves on acquired lands to ensure water availability for multiple use management and for functioning, healthy, riparian, and upland systems.
- **WAT-C1.** Manage all fluvial systems functioning at risk to meet PFCs.
- **WAT-COM9.** Upon completion, fulfill aquatic, wetland, and riparian habitat management and restoration requirements outlined in the Fort Ord Habitat Conservation Plan.

BLM Best Management Practices (BMPs) and Oil and Gas Standard Operating Procedures for water resources (listed in Appendix D) aim to control water pollution and reduce the potential for water contamination by implementing the following:

- Erosion and sediment control measures.
- Restoration of damaged wetlands or riparian areas where restoration of such systems will abate polluted runoff.
- Road construction/reconstruction, use, and management conducted to reduce sediment generation and delivery.
- Onsite confinement of runoff to reduce impacts of mechanical site preparation.
- Revegetation and restoration of disturbed areas.
- Prohibition of chemical applications or storage within 100 feet of perennial streams or channels with beneficial use(s) recognized by the State, or directly into intermittent streams or channels with beneficial use(s) recognized by the State.
- Compliance with the California General Construction Storm Water Permit, meaning all projects 1 acre in size or more require a Stormwater Pollution Prevention Plan.

In March 2015, the BLM issued a final rule regarding hydraulic fracturing on Federal and Indian lands intended to reduce risks to resources and the environment. On June 21, 2016, the United States District Court for the District of Wyoming (Case No. 2:15-CV-043-SWS) set aside the March 2015 final rule. The BLM subsequently appealed the District Court's decision to the 10th Circuit Court of Appeals (No. 16-8068). The impact assessment describes the potential risk of hydraulic fracturing to surface water with and without implementation of the BLM final rule.

4.8.2 Impacts Common to All Alternatives

Surface Water Quality

Construction of new wells and ancillary facilities will involve the use of heavy equipment to build, clear, and grade access roads, electric transmission lines, and pipelines. Disturbance of soil during construction has the potential to reduce surface water quality through the introduction of disturbed sediments into local streams or other water bodies. Sediments could be deposited directly into streams by construction, or be subsequently washed in by runoff from the disturbed areas. Accidental spills or disposal of potentially harmful materials used during construction and, if applicable, well stimulation or enhanced oil recovery, could occur as a result of on-site refueling and equipment maintenance activities, leaks from defective or poorly maintained equipment, or other construction-related activities. (Upset conditions are addressed in Section 4.4, Hazardous Materials and Public Safety.) Examples of potential construction-related pollutants include diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, drilling mud, well stimulation fluid additives (of which little is known of some of the chemical constituents (CCST, 2014; pg. 189-190)), flowback fluids and overflush from well stimulation treatments, and trash. Pollutants could reach surface waters directly, be transported by runoff into a water body, or enter surface water through flooding of the well site. Under the RFD Scenario of 37 wells, the total disturbance area subject to construction impacts would be approximately 206 acres.

All beneficial uses of surface waters within the Central Coast Oil and Gas Leasing and Development Resource Management Plan area could be affected by water quality degradation. For example, most surface waters in the area include some or all of the following designated beneficial uses: Wildlife Habitat, Cold Freshwater Habitat, Warm Freshwater Habitat, Migration of Aquatic Organisms, Spawning, Reproduction, and/or Early, Development, Commercial and Sport Fishing, Water Contact Recreation, and Non-contact Water Recreation. Degradation of surface water quality, and alteration of stream geomorphology and riparian structure, could occur with oil well development in and near surface waters and thereby affect these and other beneficial uses listed in Section 3.8.4 and in the RWQCB Basin Plans.

Oil and gas production activities have the potential for contamination of surface water, mainly through ongoing maintenance activities, with similar effects as construction, and through spills of oil, produced water and other fluids used in the operations process. (See Section 4.4, Hazardous Materials and Public Safety.) An approximate indication of expected future spills can be derived from reported spills in the past. Spills are reported to the California Office of Emergency Services (OES). From 1993 to 2014, about 7,833 spills were reported in oil fields statewide. About 12 percent of these were reported as in or potentially affecting inland surface waters (CALOES, 2015). Oil field spills reported to OES averaged roughly 39 barrels, with a median of about 6 barrels. Roughly 95% had been contained at the time of reporting.

Approximately one spill per year for every 142 active oil wells can be anticipated, based on past spills in the CCFO Planning Area of Monterey and San Benito Counties during a representative year (2013). This spill rate is based on DOGGR data of 711 active oil wells in those two counties that year (DOGGR, 2013) and five OES-reported spills in oil fields for that year and those counties (CALOES, 2015). These spills could induce water quality impacts to in-stream beneficial uses related to habitat, fish and wildlife, and recreation, as well as to downstream municipal and domestic uses if contaminants reach streams or reservoirs that are used for water supply.

Clean Water Act (CWA) and State of California regulations, applicable under all alternatives, as described in Section 3.8.2, protect surface water beneficial uses by regulating point source and certain non-point source discharges to surface water. Construction-related and industrial (production-related) discharges to surface waters would require implementation of CWA-compliant pollutant controls using best available technology (BAT) economically achievable for toxic pollutants and non-conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Examples of BAT and

BCT control technologies include runoff control, soil stabilization, sediment control, proper stream crossing techniques, waste management, spill prevention and control, and a wide variety of other measures depending on the site and situation. The BLM demonstrates compliance with the Clean Water Act and State water quality objectives by implementing BMPs that are consistent with measures required by the State.

Compliance with the Clean Water Act would include compliance with Section 404 regulating discharges into the Waters of the U.S., including wetlands. Jurisdictional determinations under Section 404 will be required on a project level. Compliance involves avoidance, minimization and mitigation of any impacts. This issue is addressed further in Section 4.10 of this report.

California Code of Regulations Title 14, administered by DOGGR, has oilfield-specific surface water protections. Additional regulations, including Clean Water Act Sections 401 and 404, and Sections 1600–1616 of the California Fish and Game Code, protect the natural riparian and ecological functions of surface waters through requiring avoidance and minimization of impacts to surface waters, and mitigation for impacts that are unavoidable. These surface water protections under the Clean Water Act establish the basic regulatory standards for preventing and mitigating adverse impacts of surface water impairments attributable to oil field activities.

In the event of well stimulation, water quality impacts are similar to those described above, with the addition of the potential for well stimulation and flowback fluids, including fluid additives, to be introduced to surface waters either by direct disposal or by accidental spill. Fluid additives may include a variety of compounds that, if introduced to surface waters, could damage beneficial uses.

BLM rules for hydraulic fracturing and well stimulation activities (described in Section 3.8.2) include measures for surface water protection and storage, use and disposal of stimulation fluids, and setbacks from intermittent and perennial streams.

For all oil and gas development, relevant Central Coast BMPs and SOPs require:

- Protecting the existing water quality improvement functions of wetlands and riparian areas as a component of NPS programs. Damaged wetlands or riparian areas are to be restored where restoration of such systems will abate polluted runoff.
- Point discharge of potential water pollutants onto the ground surface is to be prevented.
- Do not apply or store chemicals within 100 feet of perennial streams or channels with beneficial use(s) recognized by the State.
- Operators are required to obtain all required State and Federal permits for the protection of groundwater and surface water quality.
- Depleted wells are to be plugged and abandoned in a timely manner. This includes plugging the well bore with cement, removing all materials and equipment, and recontouring/revegetation as specified in the conditions of approval.
- Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the Environmental Protection Agency's Spill Prevention, Control, and Countermeasure regulation (40 CFR 112). The appropriate containment and/or diversionary structure would be sufficiently impervious to oil, glycol, produced water, or other fluid and would be used at the site so that any spill or leakage would not drain, infiltrate, or otherwise escape to the ground, surface, or navigable waters before clean-up is completed.
- Proper containment of oil and produced water in tanks, drilling fluids in reserve pits, and locating staging areas away from drainages would prevent potential contaminants from entering surface waters.

- Chemical containers should not be stored on bare ground or exposed to the sun or moisture. Labels must be readable. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture. All secondary containment must be designed to preclude entry from wildlife and livestock.
- Consider the use of a closed loop drilling system. In the absence of a closed loop system, tanks and pits must be designed to preclude the entry of wildlife and livestock.
- Produced water from oil and gas operations would be disposed of in accordance with the requirements of Onshore Oil and Gas Order #7. Oil and Gas Order #7 requires that the operator not dispose of produced water unless and until approval is obtained from the authorized officer. All produced water must be disposed of by (1) injection into the substance; (2) into pits; or (3) other acceptable methods approved by the authorized officer, including surface discharge under NPDES permit. Injection is generally the preferred method of disposal. This order also includes specifications on the design, construction and maintenance of pits and injection wells.

In addition, Central Coast BMPs and SOPs for sediment, listed under the next heading, are relevant to water quality.

Well stimulation rules developed by DOGGR under SB 4 (Section 3.8.2) also have surface water protections which include spill prevention and countermeasure plans, water management plans, product and waste storage and disposal requirements, secondary containment requirements, notification, containment and clean-up requirements for accidental spills, and restoration requirements.

For alternatives other than Alternative A (No Action Alternative), CSU stipulations (Appendix C) require that on well stimulation projects the BLM be provided with the same information required by DOGGR for well stimulation treatment activities in permit applications under SB 4. Under the CSU stipulations, BLM may require the operator to move the proposed well more than 200 meters (656 feet), modify, or delay the well completion activity in order to minimize the potential for adverse impacts to water resources.

The BLM rule on hydraulic fracturing covers hydraulic fracturing activities only. SB 4 (14 CCR Section 1783.1) applies to hydraulic fracturing and any other well stimulation treatment designed to enhance the permeability of the oil-bearing formation. Well stimulation treatments under SB 4 include, but are not limited to, hydraulic fracturing treatments and acid well stimulation treatments. Well stimulation treatments do not include steam flooding, water flooding, or cyclic steaming. Additionally, such treatments do not include routine well cleanout work, routine well maintenance, routine removal of formation damage due to drilling, bottom hole pressure surveys, or routine activities that do not affect the integrity of the well or the formation. If the BLM final rule is overturned, SB 4 rules would cover hydraulic fracturing activities on Federal mineral estate.

Well stimulation projects subject to the BLM rule on hydraulic fracturing must prepare spill control and emergency response plans to reduce the impacts of accidental spills and leaks, as well as containment in rigid above-ground tanks of all recovered fluids (including flowback and produced water). SB 4 (14 CCR Section 1783.1) also requires the operators Spill Contingency Plan to identify where handling of well stimulation fluid and additives has been addressed. Therefore, if the BLM final rule is overturned, the effect regarding storage would be substantially similar under SB 4.

The BLM final rule on hydraulic fracturing and the California SB 4 rules regulate the storage and containment of well stimulation treatment chemicals at the well site. The BLM final rule requires that recovered fluids be stored in enclosed, above-ground tanks and not be stored in sumps or pits, with very limited exception. SB 4 regulations require that recovered fluids be stored in containers but does not specifically require that the containers be enclosed. SB 4 does not allow the fluids to be stored in sumps or pits. Therefore, both SB 4 and the BLM final rule require storage of flowback in containers. However,

the BLM final rule is more stringent than the SB 4 regulations because it requires that the containers be enclosed. The potential for a surface release of flowback to occur is greater if the container is not enclosed. Although the BLM final rule requires a closed container, which is a more protective container than required under SB 4, SB 4 requires secondary containment for any production facilities in place for 30 days or more and a Spill Contingency Plan to be implemented immediately in the event of an unauthorized release. Additionally, as with the BLM final rule, SB 4 would not allow recovered fluids to be stored in sumps or pits. These measures would reduce the likelihood of contamination of surface waters.

The BLM final rule on hydraulic fracturing (see 43 CFR Part Section 3162.3-3) and California SB 4 (14 CCR Section 1788) require, among other public disclosures, a complete list of the chemicals and the maximum concentration of each and every chemical constituent of the well stimulation fluids used, so that a complete health study can be conducted. The BLM final rule requires this public disclosure within 30 days, and SB 4 requires the public disclosure within 60 days, otherwise the requirements are substantially similar. If the BLM final rule were overturned, this disclosure would continue to occur in California under SB 4. Additionally, SB 4 requires trade secret information be publicly disclosed with limited exception. Furthermore, operators are required to sample, analyze and submit the analysis to the DOGGR for all flowback fluid.

Drilling, field development and production activities associated with oil and gas exploration and development require use of a variety of chemicals and other materials, some of which would, if released to surface waters, be a source of contamination. These include drilling muds and additives which contain various contaminants such as salts, acids, mercury, cadmium, arsenic, and hydrocarbons, among others, which, if not managed correctly could, through runoff, affect surface water quality. Potential impacts of these contaminants include human contact, inhalation or ingestion and the effects of exposure, spills, or accidental fires on surface water resources. Operators of well stimulation treatments would be required to file information to BLM under the BLM final rule, as well as to DOGGR as required by SB 4, resulting in similar effects to surface water quality.

Sediment and Erosion

Erosion and siltation impacts could occur primarily through ground disturbance associated with construction of new oil and gas well pads, access roads, transmission lines, pipelines, and other infrastructure. Construction of 37 wells would disturb up to 206 acres of land, including access roads, causing potential exposure to erosion or transport off site and into surface waters, or, in the case of construction in or near streams, flow encroachments and alterations that could increase the potential or frequency of in-stream erosion. Erosion effects would be variable depending on terrain, with higher erosive potential in areas of steep terrain.

BLM rules for onshore oil and gas operations (Section 3.8.2) require operators to exercise care and diligence to avoid damage to surface or subsurface resources, which include soils that may be subject to erosion. Relevant Central Coast BMPs and SOPs require:

- Unused or unnecessary areas are to be recontoured and revegetated to reduce fugitive dust emissions from bare or eroded soils, which would reduce soil erosion impacts.
- Soil disturbance is to be limited by limiting developments to the smallest area possible and by using previously disturbed areas and existing roads to the extent practicable.
- Surface disturbance is to be minimized and disturbed areas on steep slopes designed to prevent surface water from concentrating to reduce erosion and sedimentation.
- Access is to be restricted and authorized projects suspended during wet weather when soil resources will be detrimentally affected by rutting, compaction, and increased erosion.

- Operators are to follow guidelines for site reclamation in the Oil and Gas BMP section to protect soils, including topsoil conservation, scarifying or disking soil, recontouring the area, redistributing topsoil and providing ground cover through seeding or other methods.
- No soil should be imported from off-site to limit introduction of weeds.
- Erosion and sediment control measures such as mulching, placement of certified weed free hay bales and other drainage control features, construction of rolling dips, and seasonal limits on operations reduce or eliminate erosion and sediment transport or incidental sediment discharge.
- Road construction/reconstruction is to be conducted so as to reduce sediment generation and delivery. This can be accomplished by, among other means, following designs for road systems, incorporating adequate drainage structures, properly installing stream crossings, avoiding road construction in streamside management areas, removing debris from streams, and stabilizing areas of disturbed soil such as road fills.
- Roads are to be managed to prevent sedimentation, minimize erosion, maintain stability, and reduce the risk that drainage structures and stream crossings will fail or become less effective. Components of this measure include inspections and maintenance actions to prevent erosion of road surfaces and to ensure the effectiveness of stream-crossing structures.
- Runoff is to be confined onsite to reduce impacts of mechanical site preparation and revegetation operations, particularly in areas that have steep slopes or highly erodible soils, or where the site is located in close proximity to a water body.
- Areas disturbed during road construction are to be revegetated rapidly, in particular where mineral soil is exposed or agitated.
- Construction activities that disturb one or more acres of soil or less than one acre but are part of a larger common plan of development or sale having the potential to disturb one or more acres (includes clearing, grading, and ground disturbances such as stockpiling or excavation) are required to obtain coverage under the General Permit for Discharges of Stormwater Associated with Construction Activity (General Construction Storm Water Permit), Order 2009-0009-DWQ) and manage construction in accordance with permit requirements.
- Prevent and repair soils subject to water erosion.
- Roads, well pads, and facilities for exploratory wells are to be designed to impact and fragment the least acreage practicable. New facilities must be designed to maintain natural drainage and runoff patterns. Noncommercial wells are to be restored as soon as appropriate using BLM restoration methods.
- Natural contours and overland flow patterns should be maintained to the maximum extent possible. Channelization or diversion of natural flows should be avoided to the maximum extent practical.

State of California regulations, administered by the SWRCB and DOGGR and described in Section 3.8.2, include measures for erosion protection during construction by requiring Stormwater Pollution Prevention Plans for construction, and restoration of well sites after abandonment. The Clean Water Act Sections 401 and 404, and Sections 1600–1616 of the California Fish and Game Code, provide additional protection by requiring avoidance and minimization of impacts to surface waters, and mitigation for impacts that are unavoidable.

Stream erosion has the potential to impact water quality if the erosion results in oil production pipeline breaks or other damage to storage areas or equipment that could result in spills (Section 4.4, Hazardous Materials and Public Safety).

Flooding

Oil well development has the potential to induce flood hazards, either to adjacent property or by increasing flood peaks and volumes through clearing and grading for new wells, access roads and other infrastructure. Overall, flood hazard impacts are expected to be minimal for all alternatives. Most of the Federal mineral estate lands are outside of designated floodplains. Some of the well structures, pads and other infrastructure may be located in areas of local flooding, but few new permanent structures would be involved, and the wells, pipelines and other equipment that may be on the sites and be inundated are not generally subject to high damage if flooded. Flow diversions from well pad construction or increased flood peaks with clearing and grading would be minor and local due to the small size of the well pads and other infrastructure.

Flooding has the potential to impact water quality if the flooding overflows contaminated areas, or sumps, or results in pipeline breaks and spills of contained material (Section 4.4, Hazardous Materials and Public Safety).

Water Use and Supply

Construction of new oil wells requires water mainly for drilling and construction dust control, and can be up to 0.39 to 0.77 acre-feet per well for conventional well drilling operations (See Table 4.7-1). Total water use under the RFD scenario would be approximately 12.5 to 24.6 acre-feet for conventional well drilling, not including any additional water that may be used for well stimulation. Exploratory well drilling operations would potentially use more water, between 5 to 10 acre-feet per well. In the event of well stimulation, water use could be an additional 0.4 acre-feet for each well (Table 4.7-1). Water intensive well stimulation treatments could use additional water, up to 10 to 20 acre-feet per well. Water for well drilling and stimulation could be from surface water sources or groundwater, but due to the cost and difficulty of obtaining the rights to remove surface water from streams, it typically is purchased from a local supplier and would likely come from groundwater or surface water imported from outside the area.

Total water use is estimated for two RFD scenarios (See Section 4.7.2). RFD Scenario 1 assumes that all 37 wells will be conventional vertical wells with well stimulation treatments involving one to three stages. For RFD Scenario 2, all 37 wells are assumed to be water intensive horizontal wells with well stimulation treatments involving up to 20 stages. Total water use is estimated at 29.2 to 43.3 acre-feet for RFD Scenario 1, and 555 to 1,100 acre-feet for RFD Scenario 2. Assuming a 20-year development period, total water use would range from 1.5 to 55.5 acre-feet per year for the 37-well RFD Scenario, and 1.5 to 48 acre-feet per year for the 32 wells in Alternative B.

Local short-term surface water stresses in the form of decreases in river flow could occur from groundwater pumping for the RFD Scenario. These impacts would require a site-specific analysis to evaluate. In a regional context of overall water use and supply, a total water use of 1.5 to 55.5 acre-feet per year represents only a small fraction of annual water use in the area and is unlikely to have a noticeable effect on regional water use. The Salinas Valley alone annually uses approximately 8,500 to 317,000 times the expected annual water use by the 37 wells in the RFD Scenario (MCWRA, 2006). This issue, as it relates to groundwater use, is discussed further in Section 4.7.2 of this report.

In the unlikely event direct diversion from local surface sources is used as a water supply, the use of the water should already be reflected in water planning and environmental restoration efforts undertaken by the State Water Resources Control Board and other regional and local entities. The use would also be subject to State water law principles requiring all water users to limit their water use to what is reasonable, beneficial, and not wasteful and, in the case of a new appropriative right, subject to water availability (DOC, 2015). Most surface water used by suppliers in the area of the Federal mineral estate is imported from other areas, so it is unlikely any direct use impact would occur to surface waters within the CCFO Planning Area.

Climate change could also reduce water availability, such that the use of water for well stimulation could place a burden on existing systems and other existing water users in the area. Although it is not possible to make specific determinations at this time as to where or when these kinds of impacts may occur, water usage for well stimulation could exacerbate the impacts of climate change especially on agricultural users, who use a substantial majority of water, by increasing irrigation requirements, as well as altering water availability. Well stimulation water use within the Federal mineral estate area could add to local shortages such that there would be a need for new or expanded water entitlements, or the need for new or expanded water treatment facilities, particularly should climate change occur.

The BLM final rule on hydraulic fracturing requires that the source, location, access route and transportation method for water supply be provided to BLM. The California SB 4 rules require that the source and location of water supply be disclosed as part of a water management plan and as part of post-treatment public disclosures. No difference in impact is anticipated in the event the BLM final rule is overturned.

Aquatic Intactness

For oil and gas development, the primary impacts to aquatic intactness are similar to those previously described for water quality, sediment and erosion, and water use. Thus, impacts from decreased water quality, and increase of sedimentation or erosion, or additional water use generally will cause a decline in aquatic intactness. Additional impacts from oil and gas development are varied and if present would generally result from well drilling activities as opposed to well operation or well stimulation. The removal of shading vegetation can cause an increase to stream temperature. Although unlikely due to regulation under CWA Section 404 and the State's Lake and Streambed Alternation Program, unmitigated structures placed in streams can create barriers for aquatic species passage.

4.8.3 Impacts of Alternative A (No Action)

Under Alternative A, all Federal mineral estate lands currently open for exploration would remain open to oil and gas leasing and lands currently closed would remain closed. Up to 37 wells would be developed under the RFD Scenario.

Stipulations and management actions under the 2007 HFO RMP (BLM, 2007; Appendix D) would apply to the open areas. Relevant to surface waters and the general impacts described in Section 4.8.2, these stipulations require reasonable measures to protect water resources, minimization of surface disturbances and effects on water resources, reclamation of lease sites, and, on slopes that exceed 10% within the selenium-bearing Moreno shale, the design of slope-failure measures, protective measures for off-site sediment transport, and reclamation and revegetation measures must be prepared by a licensed professional engineer. Oil sump construction and storage of oil in oil-well cellars is not permitted in floodplains.

Under Alternative A, lands outside of existing oil fields would be open for exploration and exploitation. Most of this land is now in a natural, undisturbed condition. Therefore, the impacts described below could occur in previously undisturbed areas.

Surface Water Quality

Water quality impacts are as described in Section 4.8.2, with the potential for these impacts to occur anywhere within the lands that would be open to oil exploration and production. All of the watersheds shown in Figure 3.8-1, except San Pablo Bay, could potentially be affected. The location of Federal mineral estate is such that the Salinas, Pajaro, Upper Los Gatos–Avenal, Panoche–San Luis Reservoir and, to a lesser extent, the San Francisco Bay and Coyote watersheds, are most likely to be affected by downstream transport of water quality contaminants. Major rivers and reservoirs include the Salinas River and tributaries, the San Benito/Pajaro Rivers and tributaries, the Panoche and other streams entering the Central Valley, the San Luis Reservoir, Lake San Antonio, Hernandez Reservoir, and San Luis Reservoir.

Several of the downstream waterbodies are impaired, but, with the exception of sedimentation/siltation, for reasons unrelated to the oil industry. Although there is a potential for transport of spilled materials to reach downstream waters and reservoirs, there is little potential for substantial contamination or alteration of beneficial uses or exacerbation of existing impairments for the reasons that, based on past spill records, spills in the RFD Scenario are expected to be rare and of insufficient volume to travel the long distances to downstream surface waters. (See Section 4.4, Hazardous Materials and Public Safety.) Existing regulations require immediate containment and clean-up, further reducing the potential for downstream contamination. Most water quality impacts would occur in the minor streams in the hilly terrain of the Federal mineral estate.

Sediment and Erosion

Sediment and erosion impacts are as described in Section 4.8.2, with the potential for these impacts to occur anywhere within the open lands. All of the watersheds shown in Figure 3.8-1, except San Pablo Bay, could potentially be affected.

The same downstream waters described above for Water Quality could potentially be affected by sediment disturbed from construction of well pads and access roads and transported downstream by stream flows. The total amount of sediment transported downstream will be minor due to the small area anticipated to be developed under the RFD Scenario. Roughly 206 acres would be disturbed, in comparison to 4.9 million acres for the Salinas, Pajaro, Upper Los Gatos–Avenal, Panoche–San Luis Reservoir, San Francisco Bay, and Coyote watersheds, which are most susceptible to impact due to the location of the Federal mineral estate. However, sedimentation/siltation and turbidity are listed contaminants for impairment of several streams in the area, including the San Benito River, Panoche River, Salinas River, Pajaro River, and Pacheco Creek (RWQCB, 2015), and any increase in sediment transport from the watersheds could contribute to the impairment.

Flooding

The characterization of flood impacts described in Section 4.8.2 applies to Alternative A. There are few designated floodplains within the open area of Alternative A. Impacts would be localized and on small watercourses in remote areas and mostly involve structures that are not prone to high flood damage.

Water Use and Supply

Water supply impacts of Alternative A are as described in Section 4.8.2.

Aquatic Intactness

Aquatic Intactness impacts of Alternative A are as described in Section 4.8.2 and could impact all of the HUC12 subwatersheds with the highest aquatic intactness scores as depicted in Figure 3.8-1 and listed in Section 3.8.4.

Mitigation

Mitigation measures are built into the BLM's established management actions, standard operating procedures, and stipulations. Existing regulations, described in Section 3.8.2, also mitigate potential impacts.

Mitigation Measure SWR-1 would provide protection to surface water reservoirs in cases where well stimulation, which has the potential for introducing stimulation fluid additives to surface water, and expanding the physical scope of well drilling to new land areas, is proposed. BLM managers may, at their discretion and as determined during application review, attach additional stipulations or measures to minimize or avoid surface water impacts by projects that will involve well stimulation.

SWR-1 **Protect Surface Water Reservoirs.** BLM managers may require the well stimulation applicant, in watersheds draining to open reservoirs used for the collection and storage of water for municipal supply, to provide an independent analysis, by a third party water quality expert, of the likely effects, including cumulative effects of other similar exploitation of the same subsurface resource, and from normal production operations subsequent to the well stimulation procedure, on the water quality in the reservoir. BLM managers may consider the information provided as well as information provided in consultation with the reservoir operator, in the determination of approval or denial of the application, and in the determination of pollution control measures.

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued.

Surface Water Quality. Water quality impacts are the same as those described for Alternative A in general, with the exception that potential downstream impacts are mainly limited to the Salinas River, the San Antonio River, Lake San Antonio, and Panoche River. The Upper Los Gatos–Avenal and Pajaro watersheds could be affected to a minor extent.

Sediment and Erosion. Sediment and erosion impacts are as described overall for Alternative A in general, with the potential for these impacts limited to the Salinas Watershed and the Panoche–San Luis Reservoir Watershed, and to a lesser extent the Upper Los Gatos–Avenal and Pajaro watersheds.

Flooding. The characterization of flood impacts described in Section 4.8.2 and for Alternative A in general applies to the leases. There are no designated floodplains within the area of the leases.

Water Use and Supply. Water supply impacts of the leases are the same as described in Section 4.8.2 and for Alternative A in general.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.8.4 Impacts of Alternative B

Under Alternative B, the RFD scenario would be limited to mineral estate lands within existing oil and gas fields, plus a half-mile buffer, for a total of 39,000 open acres. Because it would be limited to existing oil and gas field, there would be up to 32 wells and 179 acres of disturbance. The wildcat wells would not occur under this alternative. The alternative would be subject to stipulations and standard operating procedures that would be consistent with the management goals of the 2007 HFO RMP.

Surface Water Quality

Water quality impacts are as described in Section 4.8.2, with the potential for these impacts limited to the open lands in existing oil fields, plus any downstream waters impacted by stream transport of contaminants. Based on the location of open lands, the Panoche–San Luis Reservoir, Upper Los Gatos–Avenal, and Tulare–Buena Vista Lakes watersheds would receive the majority of impacts, with a lesser potential for impacts in the Salinas, Pajaro San Francisco Coastal South, San Joaquin Delta, and Suisan Bay watersheds. All of the other watersheds shown in Figure 3.8-1 would be unaffected. Subject to these limitations in area, the Alternative B impacts are as described for Alternative A.

Sediment and Erosion

Sediment and erosion impacts are as described in Section 4.8.2, with the potential for these impacts to occur limited to existing oil fields. Watersheds potentially affected are described under Water Quality above. Subject to these limitations in area, the Alternative B impacts are as described for Alternative A.

Flooding

The characterization of flood impacts described in Section 4.8.2 applies to Alternative B. There are few designated floodplains within the open area of Alternative B. Impacts would be localized and on small watercourses in remote areas and mostly involve structures that are not prone to high flood damage.

Water Use and Supply

Water supply impacts of Alternative B are as described in Section 4.8.2.

Aquatic Intactness

Aquatic Intactness for the HUC12 subwatersheds with the highest aquatic intactness scores as depicted in Figure 3.8-1 and listed in Section 3.8.4 would not be affected.

Mitigation

Mitigation for Alternative B is the same as for Alternative A.

Leases Subject to Settlement Agreement

Surface Water Quality. Water quality impacts are the same as those described for Alternative B in general, with the exception that none of the leases in the Salinas Watershed would be open, and therefore there would be no impacts in the Salinas Watershed. All potential impacts would be restricted to the Panoche–San Luis Reservoir watershed, and a very small portion (about 220 acres) of the Upper Los Gatos–Avenal Watershed.

Sediment and Erosion. Sediment and erosion impacts are as described overall for Alternative B in general, with the potential for these impacts limited to the Salinas Watershed and the Panoche–San Luis Reservoir Watershed, and to a lesser extent the Upper Los Gatos–Avenal and Pajaro watersheds.

Flooding. The characterization of flood impacts described in Section 4.8.2 and for Alternative B in general applies to the leases. There are no designated floodplains within the area of the leases.

Water Use and Supply. Water supply impacts of the leases are the same as described for Alternative B in general.

4.8.5 Impacts of Alternative C

Under Alternative C, the RFD Scenario would be limited to high oil and gas occurrence potential areas or within the boundaries of oil and gas fields, plus a half-mile buffer with the exception of core population areas of the kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills which are closed to leasing. Up to 37 wells would be developed under the RFD Scenario. Controlled Surface Use stipulations would apply to the open areas. The alternative would be subject to stipulations and standard operating procedures that would be consistent with the management goals of the 2007 HFO RMP.

Surface Water Quality

Water quality impacts are as described in Section 4.8.2, and essentially the same as for Alternative A, for the Estrella, Middle San Joaquin–Lower Chowchilla, Pajaro, Panoche–San Luis Reservoir, Salinas, Suisun Bay, Tulare–Buena Vista Lakes, and Upper Los Gatos–Avenal watersheds. There would be no

impacts on the other watersheds shown in Figure 3.8-1. Although within the impacted watersheds the area open to exploration is reduced from that of Alternative A, the RFD Scenario is the same, and general impacts are expected to be the same, but limited to a reduced area. Subject to these limitations in area, the Alternative C impacts are as described for Alternative A.

Sediment and Erosion

Sediment and erosion impacts are as described in Section 4.8.2. Watersheds potentially affected are described under Water Quality above. Subject to these limitations in area, the Alternative C impacts are as described for Alternative A.

Flooding

The characterization of flood impacts described in Section 4.8.2 applies to Alternative C. Impacts would be localized and mostly on small watercourses in remote areas and mostly involve structures that are not prone to high flood damage.

Water Use and Supply

Water supply impacts of Alternative C are as described in Section 4.8.2.

Aquatic Intactness

Aquatic Intactness impacts of Alternative C are as described in Section 4.8.2 and of the HUC12 subwatersheds with the highest aquatic intactness scores as depicted in Figure 3.8-1 and listed in Section 3.8.4, only the Upper Cantua Creek subwatershed could be impacted.

Mitigation

Mitigation for Alternative C is the same as for Alternative A.

Leases Subject to Settlement Agreement

Impacts for the leases subject to the settlement agreement are the same as described for Alternative A; including for water quality, sediment and erosion, flooding, and water supply. Although the area available for surface occupancy under Alternative C is slightly less than for Alternative A, the RFD Scenario is the same.

4.8.6 Impacts of Alternative D

Under Alternative D, Federal mineral estate underlying BLM surface estate would be open. Split estate lands would be closed. The Ciervo Panoche Natural Area would also be closed. Areas closed under the 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). Controlled Surface Use stipulations would apply. The alternative would be subject to stipulations and standard operating procedures that would be consistent with the management goals of the 2007 HFO RMP. Up to 37 wells would be developed under the RFD Scenario.

Surface Water Quality

Water quality impacts are as described in Section 4.8.2, and as described for Alternative A, but limited to an area of 118,100 acres in the Estrella, Pajaro, Panoche–San Luis Reservoir, Salinas, Upper Los Gatos–Avenal, Middle San Joaquin/Lower Chowchilla, Alisal–Elkhorn Slough, Coyote, and Carmel watersheds. There would be no impacts on the other watersheds shown in Figure 3.8-1. Due to the location of the open lands, most of the impacts would occur in the Upper Los Gatos–Avenal, Panoche–San Luis Reservoir, and Pajaro watersheds. Downstream waters potentially affected include the San Benito/Pajaro Rivers, including Hernandez Reservoir, and the Panoche River. The San Luis Reservoir would not be affected.

Sediment and Erosion

Sediment and erosion impacts are as described in Section 4.8.2, with the potential for these impacts limited to 151,400 acres in the Estrella, Pajaro, Panoche–San Luis Reservoir, Salinas, Upper Los Gatos–Avenal, Middle San Joaquin/Lower Chowchilla, Alisal–Elkhorn Slough, and Carmel watersheds

Flooding

The characterization of flood impacts described in Section 4.8.2 applies to Alternative D. Impacts would be localized and mostly on small watercourses in remote areas and mostly involve structures that are not prone to high flood damage.

Water Use and Supply

Water supply impacts of Alternative D are as described in Section 4.8.2.

Aquatic Intactness

Aquatic Intactness impacts of Alternative D are as described in Section 4.8.2 and of the HUC12 subwatersheds with the highest aquatic intactness scores as depicted in Figure 3.8-1 and listed in Section 3.8.4, only the Upper Cantua Creek and Robinson Creek–South Fork Orestimba Creek subwatersheds could be impacted.

Mitigation

Mitigation for Alternative D is the same as for Alternative A.

Leases Subject to Settlement Agreement

Basic impacts for the leases subject to the settlement agreement are the same as described for Alternative A, including for water quality, sediment and erosion, flooding, and water supply, but due to much of the lease area being closed, the area on which these impacts could occur is much reduced.

4.8.7 Impacts of Alternative E

Under Alternative E, Federal mineral estate outside California DWR Bulletin 118 groundwater basins and sub-basins would be open, while Federal mineral estate within these basins would be closed. Areas closed under the 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). All lands open to leasing would have CSU stipulations. NSO stipulations would be applicable within 12-digit Hydrologic Unit Codes intersecting EPA impaired, perennial surface waters; 12-digit Hydrologic Unit Codes intersecting non-impaired, perennial surface waters that intersect split estate; 12-digit HUC subwatersheds with the highest aquatic intactness score; within 0.25 miles of non-impaired, perennial surface waters; and, within 0.25 miles of eligible Wild & Scenic Rivers. The alternative would be subject to additional stipulations and standard operating procedures that would be consistent with the management goals of the 2007 HFO RMP. Up to 37 wells would be developed under the RFD Scenario.

Surface Water Quality

Water quality impacts are as described in Section 4.8.2, and as described for Alternative A, but limited to a smaller area. All watersheds shown in Figure 3.8-1 would be potentially affected except the Middle San Joaquin–Lower Chowchilla, Middle San Joaquin–Lower Merced–Lower Stanislaus, San Pablo Bay, San Francisco Coast South, San Lorenzo–Soquel, and Coyote watersheds. The NSO stipulations for hydrologic units intersecting impaired certain non-impaired waters, hydrologic units with the highest aquatic intactness, and within 0.25 miles of non-impaired perennial surface waters and eligible Wild & Scenic

Rivers would reduce, but not completely eliminate, the potential for additional contamination of those waters by increasing the distance pollutants would have to travel to reach surface waters, and increasing the response time for spill detection, control and clean-up.

Sediment and Erosion

Sediment and erosion impacts are as described in Section 4.8.2, with the potential for these impacts limited as described under Water Quality above.

Flooding

Alternative E flood impacts are as described in Section 4.8.2, but limited to the open areas for this alternative. Impacts would be localized and mostly on small watercourses in remote areas and mostly involve structures that are not prone to high flood damage.

Water Use and Supply

Water supply impacts of Alternative E are as described in Section 4.8.2.

Aquatic Intactness

Aquatic Intactness for the HUC12 subwatersheds with the highest aquatic intactness scores as depicted in Figure 3.8-1 and listed in Section 3.8.4 would not be affected.

Mitigation

Mitigation for Alternative E is the same as for Alternative A.

Leases Subject to Settlement Agreement

Basic impacts for the leases subject to the settlement agreement are the same as described for Alternative A, including for water quality, sediment and erosion, flooding, and water supply, but reduced in area due to only approximately 10,000 acres being open without NSO stipulations, compared to 17,600 in Alternative A.

4.9 Soil Resources

This section addresses the U.S. Bureau of Land Management's (BLM's) Best Management Practices (BMPs) and Standard Operating Procedures for proper management of soil resources and describes the types of impacts. Protection of soil resources involves controlling erosion and sediment transport, maintaining vegetation cover, and protecting biological and physical characteristics of soils.

4.9.1 Introduction

The management goal for soil resources established by the 2007 HFO RMP is to manage soil on BLM surface lands such that functional biological and physical characteristics that are appropriate to soil type, climate, and land form are exhibited (Rangeland Health Standards and Guidelines, 2000).

To achieve this goal the 2007 HFO RMP established the following objectives:

- Control erosion and sediment transport;
- Maintain vegetation cover at or above the level necessary to stabilize soils; and
- Protect and restore biological soil crusts on watersheds.

The 2007 HFO RMP includes the following Area-wide Management Actions to protect soil resources as follows:

- **SOIL-COM1.** Require an approved erosion control strategy and topsoil segregation/restoration plan for surface disturbance on slopes of 20 to 40 percent. Such construction must be properly surveyed and designed by a certified engineer and approved by the BLM before construction and maintenance. No surface disturbance on slopes greater than 40 percent unless it is determined that it would cause a greater impact to pursue other alternatives.
- **SOIL-COM2.** Require a topsoil segregation/restoration plan be submitted to and approved by the BLM before construction and maintenance actions that would disturb the surface of soils considered to have poor topsoil suitability or restoration potential.
- **SOIL-COM3.** Close roads and trails to public use during periods of extreme wet weather in areas where sustained public use may compromise the integrity of the road or trail surface.
- **SOIL-COM4.** Implement soil loss assessment procedures for road and trail maintenance.
- **SOIL-COM5.** Implement best management practices (BMPs) for non-point source pollution control.

BLM Best Management Practices/Standard Operating Procedures for soil resources (Appendix D) would reduce soil disturbance, restrict access during wet weather, and require site reclamation at oil and gas sites.

Additional BMPs to control stormwater runoff and erosion would be required under the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. Please see Section 3.9.2 (Regulatory Framework) for a description of CWA requirements.

4.9.2 Impacts Common to All Alternatives

The RFD Scenario (i.e., between zero and 37 development wells with up to approximately 206 acres of surface disturbance over the next 15 to 20 years on Federal mineral estate in the Planning Area) would occur under all of the alternatives. This will require construction of access roads, drill pads, and pipelines and other oil field facilities, as each are included as part of the surface disturbance.

In general, regardless of erosion potential, all soils become erodible when disturbed and the drilling of new wells will require ground disturbance. Grading for access roads and drill pads will cause ground dis-

turbance that could result in soil erosion. Drilling of new oil and gas wells and geophysical surveys will create loose soil or compacted soil that leads to increased runoff and erosion. Soil erosion could lead to sedimentation of local surface waters or increased flooding. Soil erosion at oil well sites may also transport chemical contamination (caused by accidental releases) to waterways or decrease soil fertility at the spill site or deposition site.

The soil resource Management Actions established with the 2007 RMP require approved erosion control strategies and topsoil segregation/restoration plans for activities on slopes ranging from 20 to 40 percent, and no soil disturbance activities are allowed on slopes greater than 40 percent. The existing management actions will prohibit high-impact activities in sensitive areas and promote restorative measures that would minimize or avoid impacts (BLM, 2007).

Implementation of the BLM BMPs developed to protect soil resources (Appendix D, Section 1.5) will reduce soil disturbance, restrict access during wet weather, and require site reclamation at oil and gas sites. The soil protective BMPs include:

- Minimize soil disturbance by limiting developments to the smallest area possible and by using previously disturbed areas and existing roads to the extent practicable.
- Minimize surface disturbance and design disturbed areas on steep slopes to prevent surface water from concentrating to reduce erosion and sedimentation.
- Restrict access and suspend authorized projects during wet weather when soil resources will be detrimentally affected by rutting, compaction, and increased erosion.
- Minimize fire control lines, both handline and dozerline, to the width necessary to effectively stop fire spread. Rehabilitate lines by smoothing out berms and installing waterbars prior to the rainy season.
- Assess the need for soil stabilization following wildfires. Use the Emergency Stabilization and Rehabilitation process to determine and implement needed actions.
- Follow guidelines for site reclamation in the Oil and Gas BMP section to protect soils, including topsoil conservation, scarifying or disking soil, recontouring the area, redistributing topsoil and providing ground cover through seeding or other methods. No soil should be imported from off-site to limit introduction of weeds.
- Actively patrol public lands to prevent unauthorized off-road travel. If unauthorized routes are found, block access to minimize further soil disturbance and reduce the potential for erosion through rehabilitation action.

Additionally, BMPs for Water Resources Protection (Appendix D, Section 1.6.1) include:

- Design roads, well pads, and facilities for exploratory wells to impact and fragment the least acreage practicable. New facilities shall be designed to maintain natural drainage and runoff patterns. Noncommercial wells shall be restored as soon as appropriate using BLM restoration methods.
- Prevent and repair soils subject to water erosion.
- Timely plugging and abandonment of depleted wells will be required. This includes plugging the well bore with cement, removing all materials and equipment, and recontouring/revegetation as specified in the conditions of approval.

The BLM Oil and Gas Standard Operating Procedures (SOPs) specifically require surface reclamation, interim and final (Appendix D, Section 1.8.8) for any petroleum exploration and development. Reclamation is required for any disturbed surface that is not necessary for continued production operations. The site reclamation guidelines address general operations, producing well sites, non-producing wells, and final reclamation (Appendix D).

4.9.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario while continuing current management under the existing 2007 HFO RMP (BLM, 2007). Drilling up to 37 new oil and gas wells would require grading and ground disturbance that would result in soil erosion without mitigation.

Mitigation

S-1 **Prepare and Submit SWPPP.** A Storm Water Pollution Prevention Plan (SWPPP) would be required for grading and ground disturbance activities exceeding 1 acre. The SWPPP should delineate and address the BLM's soil resource BMPs and SOPs (Appendix D).

S-2 **Prepare and Submit Reclamation Plan.** A surface reclamation plan should be developed addressing the interim or final restoration guidelines established by BLM (Appendix D, Section 1.8.8).

Leases Subject to Settlement Agreement – Subalternative 1

The 14 non-NSO leases as identified in Case No. 11-06174 and Case No. 13-1749 would be issued. These leases are located in areas with sparse vegetation and erodible soils. Well drilling, well stimulation, and possibly field development in the Vallecitos field may occur in these leases. Although these leases either have not been granted or have been suspended, it is possible that some or all of the 37 exploratory or development wells could be drilled on these leases in the future and could lead to soil erosion. Consequently, Mitigation Measures S-1 and S-2 could be implemented to protect erodible soils before granting the lease or included as a lease stipulation.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.9.4 Impacts of Alternative B

Alternative B would allow leasing in existing oil and gas fields defined by DOGGR with 754,000 acres closed to leasing. Regardless, the open areas could experience exploration by up to 32 new wells and would have the same potential for creating soil disturbance and increased soil erosion as Alternative A.

Mitigation

Mitigation Measures S-1 and S-2 would apply to Alternative B.

Leases Subject to Settlement Agreement

Under Alternative B for the 14 non-NSO leases, the soils resources impacts and mitigation are the same as Alternative A.

4.9.5 Impacts of Alternative C

Alternative C would allow leasing in high oil and gas occurrence potential areas with 394,400 acres closed to leasing. Regardless, the open areas could experience exploration by up to 37 new wells and would have the same potential for soil resources access restrictions as Alternative A.

Mitigation

Mitigation Measures S-1 and S-2 would apply to Alternative C.

Leases Subject to Settlement Agreement

Under Alternative C for the 14 non-NSO leases, the soils resources impacts and mitigation are the same as Alternative A.

4.9.6 Impacts of Alternative D

Alternative D would allow leasing in Federal mineral estate underlying BLM surface estate areas with 655,400 acres closed to leasing. The open areas could experience exploration by up to 37 new wells and would have the same potential for impacts to soil resources as Alternative A.

Mitigation

Mitigation Measures S-1 and S-2 would apply to Alternative D.

Leases Subject to Settlement Agreement

Under Alternative D for the 14 non-NSO leases, the soils resources impacts and mitigation are the same as Alternative A.

4.9.7 Impacts of Alternative E

Alternative E would allow leasing in Federal mineral estate outside of California DWR designated groundwater basins and sub-basins with 99,400 acres closed to leasing. The open areas could experience exploration by up to 37 new wells and would have the same soil resources impacts as Alternative A.

Mitigation

Mitigation Measures S-1 and S-2 would apply to Alternative E.

Leases Subject to Settlement Agreement

Under Alternative E for the 14 non-NSO leases, the soils resources impacts and mitigation are the same as Alternative A.

4.10 Biological Resources – Vegetation

4.10.1 Introduction

Biological resources include the plant and animal species and populations, natural communities, and ecosystem processes that occur within the Planning Area. A diversity of vegetation communities, habitats, and plant and animal species, including numerous special status species, occur on BLM surface lands. This section discusses impacts on vegetation communities and habitat, both common and sensitive, and applicable mitigation.

Vegetation communities may be recognized as sensitive or afforded other special conservation status due to high natural importance to many species (e.g., riparian or wetlands habitat); dependence of certain special-status species on the community as its habitat, including designated critical habitat; or rarity of the natural community, due either to inherent rarity or to human-related causes. Examples of particularly sensitive natural communities are aquatic and riparian habitats, coastal or inland wetlands, vernal pools, coastal sage scrub, and old growth forest. For purposes of this analysis, sensitive natural communities include the following:

- Habitat or vegetation that may support special-status plants, fish, or wildlife;
- Habitat or vegetation meeting criteria as wetlands according to State or Federal delineation criteria;
- Riparian habitat, including any vegetation or habitat that is distinct from surrounding upland habitat, and is dependent upon intermittent, seasonal, or perennial soil moisture from a nearby source;
- Communities recognized by CDFW as sensitive (i.e., as noted in the Natural Communities List (CDFG, 2010);
- Habitat designated by USFWS as "critical habitat" for a federally listed threatened or endangered species; or
- Habitat recognized as "essential habitat" for a federally listed species, even if the habitat is excluded from the final critical habitat designation.

BLM Vegetation Goals

The Resource Management Plan ROD (BLM, 2007) lists goals and objectives that define the desired future conditions for the vegetation resource. The goals for vegetation resources are to (1) restore, maintain, or improve ecological conditions, natural diversity, and associated watersheds of high value, high-risk native plant communities and unique plant assemblages, and (2) to restore degraded landscapes and plant communities.

To achieve this goal the following objectives are established:

- Provide a mosaic of vegetative communities to protect soil, watershed, and wildlife; maintain sustained yield of vegetation for consumptive and non-consumptive uses.
- Rehabilitate disturbed areas to stabilize soils and promote growth of desired plant communities.
- Prevent the introduction and proliferation of noxious and invasive weeds.

Methods of Analysis

The analysis of direct and indirect effects is focused on species, populations, and habitats within the Planning Area. Direct impacts are the direct or immediate effects of an action on biological resources. Examples of direct impacts to vegetation include removal or degradation of the vegetation. Indirect impacts are those effects that are caused by or will result from the action, later in time or farther removed in distance, but are still reasonably certain to occur. Examples of indirect effects to native habitat and vegetation include

erosion, sedimentation, and introduction of invasive species that may compete with native species and cause habitat degradation.

Effects to habitat may be short-term and temporary or long-term and permanent. See Section 4.1.2 for definitions of these terms specific to this document. Long-term and permanent impacts would preclude most natural vegetation and habitat function throughout the life of a proposed project, or longer. Examples of long-term impacts are removal of vegetation for well pads and access roads. Short-term and temporary impacts refer to project effects such as construction-phase disturbance, without long-term or permanent land use conversion, so that vegetation may return to a more natural condition or may be actively revegetated or enhanced within a few years.

Short-term and temporary impacts include vegetation removal for temporary staging areas or cut and fill slopes, where vegetation may recover naturally or mitigation efforts (such as revegetation or ecological restoration) may replace it within a few years following disturbance.

Potential effects of management actions to species, populations, and habitats were identified by a team of biologists. A GIS data set and overlays of resources and land uses was used to analyze effects. In the absence of quantitative data, best professional judgment was used to provide qualitative information.

Assumptions

Assumptions used in this impact analysis include the following:

- All actions undertaken as part of this RMPA would be assessed in accordance with the National Environmental Policy Act (NEPA) and the Federal Endangered Species Act. If required, consultation with the USFWS would be completed. Best Management Practices (BMPs), Standard Operating Procedures (SOPs), mitigation measures, and terms and conditions in this RMPA and subsequent NEPA documents and biological opinions will be applied and followed.
- Valid existing rights, such as existing oil and gas leases, private mineral rights, and existing land use authorizations, would be honored, but BMPs, SOPs, stipulations, mitigation measures, and terms and conditions in this RMPA and subsequent NEPA documents and biological opinions will be applied and followed.
- If additional special status species or critical habitat is designated or discovered, the objectives and decisions in this RMPA would extend to such species as well.
- Over time, species distribution may change. Management action locations would change accordingly.
- Impacts on special status species would be similar to those discussed for species with no special status. Special status species may be more restricted in distribution, reducing the likelihood that certain activities would interact with them. However, impacts on special status species could be more pronounced due to reduced population sizes and ranges and increasing threats. More emphasis would be placed on avoiding or minimizing project effects on special status species since their populations are already in decline. Similarly, more emphasis would be placed on implementing conservation actions for special status species.
- Incomplete information includes undiscovered locations of special status species that may occur on public land and Federal mineral estate. A complete survey of the Planning Area has not been conducted and is not feasible; however, it is still possible to make informed decisions regarding impacts to special status species, based upon an understanding of impacts that are known to affect species in general.

Generalized impacts from oil and gas development, including hydraulic fracturing and other well stimulation techniques, are common to all alternatives. These generalized impacts are presented below. The impact discussion presented for each alternative focuses on the particular impacts of that alternative and builds on the discussion of generalized impacts that occur under all alternatives.

Management Actions

The ROD (BLM, 2007) lists a number of land use management actions to address identified issues, management concerns, and current and projected future uses of the lands administered by the CCFO in the Planning Area. The area-wide management actions that may be relevant to oil and gas development include, but are not limited to:

- **VEG-COM2.** Include mitigation measures to protect or enhance riparian areas in all activity or project plans.
- **VEG-C1.** Rehabilitate vegetative cover following wildland fires and/or other surface-disturbing activities in a timely manner. Allow use of non-persistent (or temporary), non-native, non-invasive species to be used in re-vegetation materials.
- **VEG-C3.** Mitigate or relocate proposed activities within 250 feet of riparian vegetation if the activities have long-term negative impacts on riparian resources.
- **VEG-C6.** Expand the use of an Integrated Pest Management program to prevent the introduction and proliferation of noxious and invasive weeds on 10,000 acres within 10 years throughout the resource area.

Lease Stipulations

Lease stipulations are used to protect resource values. See discussion in Section 2.5.1. Controlled Surface Use (CSU) stipulation means that use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operation constraints that may modify the lease rights. The specific constraints would be applied based on the biological resources present and may include provisions to address protected species; sensitive species; critical habitat; raptors; or priority species, plant communities, and habitat. No Surface Occupancy (NSO) stipulation prohibits any surface disturbance on the lease land.

BMPs and SOPs

Leasing fluid mineral resources does not confer on the lessee the right to conduct any ground disturbing activities related to exploring for or developing the resources until a subsequent environmental analysis of the actual proposed operations for the site is conducted. There are various stages of fluid minerals resource development within a lease, such as exploration, development, production, and reclamation/closeout. These activities all require additional BLM authorization. All proposed drilling or production operations for fluid minerals production to be conducted on a lease must be approved before surface disturbance is allowed. Surface disturbance is proposed in Applications for Permit to Drill (APDs), Rights-of-Way (ROWs), and Sundry Notices. During BLM NEPA review of these applications, site-specific appropriate mitigation and environmental protection measures are developed and approved prior to conducting ground disturbing activities. This sequential approval process (leasing, operations plan approval, etc.) allows BLM to consider application of restrictions at the appropriate action level. Restrictions are formulated at the proper stage when site-specific information is available.

BMPs and SOPs are land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to provide the most effective, environmentally sound, and economically feasible means of managing an activity and mitigating its impacts. SOPs are the management controls and performance standards required for implementation of a specific type of action. These practices are intended to protect and enhance natural resources that could be affected by management actions. Interdisciplinary site-specific analysis is necessary to determine which management practices would be necessary to meet specific goals.

BMPs are selected and implemented as necessary, based on site-specific conditions, to meet a variety of resource objectives for specific management actions. Additional BMPs or modifications may be identified to minimize the potential for negative impacts when evaluating site-specific management actions through an interdisciplinary process. In addition, implementation and effectiveness of BMPs need to be monitored to determine whether the practices are achieving resource objectives and accomplishing desired goals, and adjustments made as necessary.

The BMPs and SOPs for this RMPA (Appendix D: Sections 1.2 through 1.6, and 1.8) include a number of measures that would reduce impacts to vegetation and habitat. The topics addressed are briefly summarized below; see Appendix D for complete text of measures.

- Minimize surface disturbance and avoid and minimize impacts to biological resources. Use previously disturbed areas to the extent practicable. Design projects to minimize habitat impacts and fragmentation.
- Conduct monitoring by BLM staff and BLM-approved biologists.
- Control fugitive dust.
- Recontour and restore disturbed sites and unneeded roads to natural conditions. Develop restoration plans and requirements. Conduct restoration monitoring.
- Conduct biological surveys prior to disturbance and at the appropriate time of year to detect sensitive species and important biological resources. Conduct surveys in compliance with agency protocols.
- Control vehicle speeds to reduce potential for roadkill, to minimize dust, and to protect sensitive animals and habitats. Use existing roads to the greatest extent practicable. Prohibit unapproved off-road travel.
- Design stream crossings to minimize adverse impacts to soils, water quality, and riparian vegetation. Maintain natural drainage patterns.
- Contain oil spills. Promptly notify the appropriate agencies of oil spill events. Prevent discharge of biological toxicants onto the ground surface. Clean up hazardous spills.
- Conduct a worker education program to train project personnel on sensitive biological resources.
- Perform in kind compensation for impacted habitat.
- Minimize the introduction and spread of weeds.
- Minimize erosion and sedimentation. Protect water quality.
- Protect air quality.
- Avoid vernal pools, natural ponded waters, and washes during geophysical exploration.

4.10.2 Impacts Common to All Alternatives

Under the Reasonably Foreseeable Development (RFD) Scenario for oil and gas development on Federal mineral estate in the Planning Area, within the next 15 years there is expected to be: zero to 32 new development wells, most likely all within the existing Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields, but potentially occurring anywhere that is open to oil and gas leasing; 3 to 5 exploratory wells outside existing fields, most if not all in areas of high oil and gas occurrence potential; and geophysical exploration. New surface disturbance of between 22 to over 206 acres is expected to be associated with this development. This acreage does not include disturbance within previously disturbed areas and the total disturbance area could potentially be greater than 206 acres. Areas of high oil and gas occurrence potential (Figure 4 of the RFD Scenario) generally correspond to identified oil and gas plays within the San Joaquin and Salinas Basins. See Appendix B for full details.

Oil and gas leasing would have short-term and long-term direct and indirect effects on vegetation and habitat if new or existing leases are developed. Geophysical exploration would result in many of the same impacts as other oil and gas activities but often results in short-term impacts on biological resources, particularly if the ground disturbance is confined to previously disturbed areas or to grasslands or similar vegetation types where natural recovery occurs within a short time span without additional restoration efforts.

Oil and gas development results in both short-term and long-term vegetation loss from installing roads, pipelines, power lines, drilling pads, sumps, and production facilities; from contouring surface profiles; and from making other surface modifications. Installation of roads and pipelines results in vegetation removal along linear routes, fragmenting the undisturbed vegetation. Construction can damage or destroy vegetation. Surface disturbance and travel on dirt roads create dust, which reduces photosynthesis and reproduction in plants. Oil spills or leaks can coat vegetation and soil. Soil disturbance can promote invasion or spread of non-native weeds. Weed species not currently present in the area can be inadvertently introduced and spread by oil field workers and equipment.

Depending on the affected vegetation, the loss of relatively small acreages for activities related to oil and gas development could cause substantial reduction of fish and wildlife habitat values. Similarly, depending on the affected vegetation community, the loss of relatively small acreages for oil and gas development could cause substantial reduction in the overall extent of the community. By contrast, activities (and associated disturbance) affecting sites with little native habitat value would not have substantial impacts to fish and wildlife habitat or sensitive vegetation communities. Examples of sites with little native habitat value include land already in industrial use such as operating well pads or other production-related disturbed lands.

Some future oil and gas leases may be located entirely or partially on open space lands supporting native vegetation types including, but not limited to, those described in Section 3.10. Impacts to native vegetation would be most likely for oil and gas development activities located outside of existing oil and gas fields or in fields where oil and gas production land uses are intermixed with native habitats.

Oil and gas development activities could affect wetlands as defined by Section 404 of the Clean Water Act. These impacts could include placing fill material into jurisdictional waters to provide level, dry work areas, drill pads, or roadways; constructing roadways, culverts, or other crossing structures across jurisdictional channels; installing channel armoring (such as riprap) in a channel near a work site to prevent flooding or erosion; constructing impoundments or detention basins on jurisdictional channels; grading or other site preparation that eliminates or redirects natural runoff; or impacts from spills of hazardous materials that may enter jurisdictional waters. Potential adverse effects are not limited to wetlands or mapped "blueline" streams; similar effects to intermittent channels or washes may also be substantial. Impacts to waters, including intermittent channels, could also affect downstream wetlands, riparian, or aquatic habitat and fish or wildlife found in those downstream habitats.

In addition, oil and gas development activities could affect lakes or streams (including seasonally or intermittently dry lakes or streams) that may not meet the Federal definition as wetlands, yet fall under State or Federal jurisdictional criteria as waters of the State or waters of the U.S. Even in the absence of State or Federal jurisdiction, the impacts of oil and gas development activities to perennial, seasonal, or intermittent wetlands, lakes, or streams may affect special-status wildlife, local biological diversity, or special-status natural communities.

Projects affecting waters of the State or waters of the U.S. will be subject to permitting under the California Fish and Game Code and Federal Clean Water Act. Each project applicant must prepare and submit appropriate applications, notifications, and fees to the USACE (according to Section 404 of the CWA), the CDFW (according to Sections 1600–1616 of the California Fish and Game Code) and the California Regional Water Quality Control Board (RWQCB; according to Section 401 of the CWA).

Federal CWA permitting is required for projects that would place dredged or fill material into jurisdictional waters of the U.S. State authorization is required if projects would substantially divert or obstruct the natural flow of any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

In addition to the direct impacts to habitat, oil and gas development activities could have several direct or indirect impacts to surrounding vegetation and habitat. The extent and significance of these indirect habitat effects would be dependent on the sensitivity of adjacent habitat and the fish and wildlife it supports. These impacts may include:

- Introduction or spread of invasive species;
- Dust caused by project activities or vegetation removal;
- Altered local surface hydrology, causing short-term or long-term habitat inundation behind berms, or interruption of downstream flow and sediment delivery; or
- Reduced surface or groundwater availability, caused by pumping from a surface source such as a lake, stream, spring, or a groundwater source, reducing surface or soil water availability for wildlife drinking water sources, or wetland, riparian, or aquatic habitat.
- Spills and releases of well stimulation fluids, hydrocarbons, or other project-related contaminants, and resulting cleanup efforts, may cause short-term and temporary and long-term and permanent loss and degradation of habitat.

Surface water contamination, if any, could affect vegetation and wetland resources at the contamination site or downstream. Potential effects to biological resources include damage to plant roots or physiology if the contaminant is taken up by plants. Spilled hydraulic fracturing fluid, or returned fluid mixed with oil, probably would not behave in the same way as oil (i.e., the hydraulic fracturing fluid would generally be water soluble, whereas oil would not).

Groundwater contamination, if any, could affect these resources at natural seeps or springs where the groundwater source discharges to the surface. Or, groundwater contamination could affect biological resources if a groundwater well is used as a water source for wetlands, fisheries, or other wildlife benefits (e.g., a water source for managed wetlands or for wildlife drinking). The actual distance to seeps, springs, or wells that could be affected will be site-specific, dependent on the groundwater resource extent and flow characteristics.

Potential surface water and groundwater quality impacts are described in Section 4.7 (Groundwater Resources) and Section 4.8 (Surface Water Resources). The operator must comply with all applicable regulations regarding storage and handling of project-related contaminants.

Potential air quality impacts are described in Section 4.5 (Air Quality). Air pollution generated by oil and gas development activities may also affect the health of vegetation. The operator must comply with all applicable regulations regarding air quality.

Climate change is described in Section 4.6 (Climate Change/Greenhouse Gas Emissions). Climate change is likely to cause drier summer vegetation conditions (i.e., decreased fuel moisture) and increasingly severe wildfires; reduced or altered food, cover, and water availability for fish and wildlife; habitat conversion as dominant plants are excluded from warmer and drier conditions at their lower elevational and latitudinal extents; generally earlier timing of seasonal activity periods for plants and animals (e.g., blooming, bird nesting, and insect flight seasons); reduced populations of anadromous fish (e.g., salmon and steelhead) and coastal birds, which are both dependent on productive nearshore feeding areas; and inundation of low-lying coastal habitats, including wetlands.

Vulnerability to the effects of climate change varies widely by species, according to ranges of tolerance to physical and biotic conditions for each species, and interaction among these inherent ranges and other changes throughout the environment. Retention of biological connectivity and facilitation of wildlife movement among habitat areas is the primary mitigation strategy to minimize expected effects of global climate change to biological resources. Many species or populations may need to move on a regional scale from areas of declining habitat suitability to areas of stable or increasing habitat suitability.

Oil and gas leasing on Federal mineral estate within the Planning Area would generate greenhouse gas emissions that contribute to global climate change. The effects of global climate change, in turn, would affect biological diversity. However, under all alternatives, this contribution would be minor. New oil and gas development on up to 206 acres within the Planning Area would also have a minor effect on regional biological connectivity.

General Mitigation

Under all alternatives, BLM management actions to conserve, restore, and enhance biological resources, including vegetation, would continue to be implemented. These proactive measures include direction to retain and acquire important native vegetation and habitat; secure areas important for listed species recovery (e.g., compensation lands); maintain, enhance, and restore native vegetation and habitat, including riparian habitat; maintain linkage between areas of natural habitat; improve the knowledge base of the species and lands under BLM management; and manage all public lands appropriately. In addition, the designation of special areas with high biological value as Areas of Conservation Concern (ACECs) and Special Management Areas (SMAs) would establish management objectives and use restrictions that would help protect important biological resources from human activities and result in the long-term maintenance of high-quality habitat across the landscapes where BLM surface lands occur.

Restrictions on certain activities to minimize impacts on biological resources, including vegetation, would continue to be imposed. These include such protective measures as lease stipulations, Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) for oil and gas development (described above), and the closure of sensitive areas to oil and gas development. All of these actions would benefit vegetation and habitats at the local and landscape scales by eliminating or reducing negative impacts stemming from development.

In addition, site-specific evaluations of proposed ground disturbing activities will include delineations of State or federally hydrologic features, including wetlands, to determine whether State or Federal permitting may be required. Where proposed activities may fall under State or Federal jurisdiction, each lease holder or applicant will provide notification or application materials to CDFW, RWQCB, and USACE as required under Sections 1600-1616 of the California Fish and Game Code and Sections 401 and 404 of the Clean Water Act.

Implementation of lease stipulations, BMPs, SOPs, and compliance with CWA requirements would avoid and/or minimize potential impacts to biological resources. Species-specific surveys and species avoidance and habitat protection and compensation measures would minimize impacts of oil and gas development activities on special status species.

Under any of the Alternatives analyzed below, the actual impacts of future oil and gas development would depend on the specific extent and locations of surface disturbance. Each alternative identifies specific areas as either open or closed to development, or subject to NSO stipulations. Based on these designations, Alternative A (the No Action alternative) is the least restrictive regarding future disturbance to vegetation resources, and Alternative B is the most restrictive. That is, Alternative A could result in the greatest disturbance to native vegetation (up to 206 acres), and Alternative B could result in the least. Potential vegetation impacts of Alternatives C, D, and E would fall between the others, based on specific restrictions of each one. These comparisons are generalities, and the actual impacts under any alternative would be identified during site-specific evaluations of future development proposals.

Additional Mitigation

Compensation. Within the San Joaquin Valley, for every habitat acre permanently disturbed, 3 acres are set aside as compensation. For temporary disturbance, 1.1 acre is set aside. These ratios apply within the San Joaquin Valley, with the following exceptions:

- Within the Ciervo Panoche Natural Area the compensation ratio will be 4:1 for permanent impacts.
- The compensation ratio for vernal pool habitat will be 5:1 with a replacement element.
- If a new compensation ratio becomes established for a county or species, the BLM and USFWS may modify compensation ratios.

For protected lands (such as Federal lands, State wildlife areas, conservation banks) a replacement component will be added to the compensation ratio.

Compensation of habitat must be in kind. Land used for compensation must be of equal value or better than the land impacted. The same species must be present and habitat must be of an equal or greater value. Lands used for compensation for project impacts on San Joaquin woollythreads, California jewelflower, blunt-nosed leopard lizard, and kangaroo rats must support these species or be approved by the USFWS for these species. Lands used to compensate for impacts on a kit fox natal den must support breeding populations of kit foxes.

See Section 1.4.4 of Appendix D (Compensation) for full details.

4.10.3 Impacts of Alternative A (No Action)

Alternative A is the No Action Alternative. The No Action Alternative would continue the current management goals, objectives, and direction for oil and gas as specified in the 2007 Hollister Field Office RMP. Areas currently open would remain open to oil and gas leasing, and areas closed under the 2007 RMP would remain closed (Wilderness, Wilderness Study Areas (WSAs), Clear Creek Serpentine ACEC, and Fort Ord National Monument). See Chapter 2 (Alternatives) for further information.

No surface occupancy (NSO) stipulations would be applied to new leases in ACECs and Recreation and Public Purpose (R&PP) leases. The NSO stipulation prohibits any surface disturbance on the lease land. Where applicable, the NSO stipulations prevent surface disturbance and potential for interactions between oil field activities and biological resources in these areas. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing (see Appendix D in BLM, 2007).

Under Alternative A, approximately 86 percent of BLM oil and gas Federal mineral estate would be open to oil and gas leasing with the CSU – Protected Species stipulation and subject to impacts as described in Section 4.10.2. Approximately 8 percent would be closed to oil and gas leasing and 6 percent would be subject to NSO lease stipulations. Under the RFD Scenario, the expected zero to 32 new development wells, most likely all within the existing Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields, but potentially occurring anywhere that is open to oil and gas leasing, could still occur. The 3 to 5 exploratory wells outside existing fields could only occur within any of the Federal mineral estate lands open to oil and gas leasing.

The impacts of Alternative A on vegetation and habitat would be identical to existing conditions. In regard to BLM vegetation goals (see Section 4.10), with implementation of mitigation as described below, Alternative A has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major, depending on the extent and locations of surface disturbance for exploration and development. For example, impacts of new development on common vegetation communities that do not support special-status species would be minor,

whereas new surface disturbance in sensitive vegetation types such as riparian communities or vernal pools could have major effects to vegetation and habitat. Site-specific analysis would be required to determine actual extent of the impacts.

Mitigation

Under Alternative A, measures to minimize impacts on vegetation communities and habitat would continue to be applied to oil and gas leases. Examples of these measures are oil and gas stipulations included in Appendix D of the RMP FEIS (BLM, 2006), and the BMPs and SOPs that are included in Appendix D of this RMPA.

The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing. Although primarily directed at special status species, this stipulation also has the following requirements:

- Minimize impacts to biological resources.
- Take reasonable measures required by the BLM to protect resources.
- Specialized habitats such as riparian areas, vernal pools, other wetlands, floodplains, native perennial grasses, saltbrush, and oak woodlands would be avoided by surface disturbing activities when practical and feasible alternatives exist.

General mitigation as described in Section 4.10.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to vegetation resources, avoidance of sensitive vegetation resources where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, all areas of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and would be issued, as such they would be subject to resulting impacts as discussed above. The lease areas total approximately 17,600 acres. These leases do not include any lands designated as Wilderness, WSAs, Clear Creek Serpentine ACEC, or Fort Ord National Monument. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas of the leases.

Impacts and mitigation within these leases would be the same as described for the Planning Area as a whole (Section 4.10.2).

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.10.4 Impacts of Alternative B

Under Alternative B, lands within oil and gas fields and a 0.5-mile buffer area, as currently defined by DOGGR, would be open and all other areas would be closed. All lands open to leasing would implement Controlled Surface Use (CSU) stipulations as appropriate. Please see Chapter 2 (Alternatives) for further information.

The CSU stipulations mean that use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operation constraints that may modify the lease rights. The specific constraints would be applied based on the biological resources present and may include provi-

sions to address protected species; sensitive species; critical habitat; raptors; or priority species, plant communities, and habitat, and specific constraints based on surface restrictions associated with the Department of Defense as appropriate.

Under Alternative B, approximately 4 percent of BLM Federal mineral estate is identified as open to oil and gas leasing and subject to impacts as described in Section 4.10.2. Approximately 96 percent would be closed to leasing, which would eliminate surface disturbance and potential for interactions between oil field activities and biological resources in these areas.

Potential impacts within existing oil and gas fields and the surrounding 0.5-mile buffers would vary depending on site-specific factors, such as the type of native vegetation and habitat present in the field, and the extent and location of oil and gas development disturbance. All the development would be limited to the existing oil and gas fields and surrounding 0.5-mile buffers. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

The impacts of Alternative B on vegetation and habitat are likely to be substantially reduced from existing conditions (i.e., the No Action Alternative) due to limitations on the locations of future wells. Alternative B would have up to 32 wells drilled, rather than 37, because it is limited to the existing oil and gas fields and 0.5-mile buffer area and the 5 exploratory wells would not be drilled. As a result, ground disturbance associated with Alternative B would be up to 179 acres.

In regard to BLM vegetation goals (see Section 4.10), with implementation of mitigation as described below, Alternative B has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 179 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, impacts of new development on common vegetation communities that do not support special-status species would be minor, whereas new surface disturbance in sensitive vegetation types such as riparian communities or vernal pools could have major effects to vegetation and habitat. These resources could be located within existing oil and gas fields, or within the surrounding 0.5-mile buffer areas. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative B, measures to minimize impacts on vegetation communities and habitat would continue to be applied to oil and gas leases. Examples of these measures are the oil and gas stipulations (Appendix C of this RMPA) and the BMPs and SOPs that are included in Appendix D of this RMPA.

General mitigation as described in Section 4.10.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to vegetation resources, avoidance of sensitive vegetation resources where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative B, a portion of the area of 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.7.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, 22 percent would be open and 78 percent would be closed. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

Impacts and mitigation within these leases would be the same as described for the Planning Area as a whole (Section 4.10.2).

4.10.5 Impacts of Alternative C

Under Alternative C, high oil and gas occurrence potential areas would be open. Moderate, low, and no oil and gas occurrence potential areas would be closed, as well as core population areas of the kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills. Areas closed under the 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). All lands open to leasing would have CSU stipulations, as described under Alternative B. NSO stipulations would apply to critical habitat, BLM-developed recreation and administration sites, and special status split estate lands (state parks, county parks, conservation easements, land trusts, and scenic designations). The NSO stipulation prohibits any surface disturbance on the lease land. Please see Chapter 2 (Alternatives) for further information.

Under Alternative C, approximately 47 percent of BLM oil and gas Federal mineral estate are identified as open to oil and gas leasing and subject to impacts as described in Section 4.10.2. Approximately 49 percent would be closed to leasing and 4 percent would be subject to NSO stipulations, which would eliminate surface disturbance and potential for interactions between oil field activities and biological resources in these areas.

Potential impacts to vegetation resources would vary depending on site-specific factors, such as the type of native vegetation and habitat present and the extent and location of oil and gas development disturbance. NSO stipulations would avoid impacts to biological resources on critical habitat and special status split estate lands.

Depending on where new oil and gas leases are located, the impacts of Alternative C on vegetation and habitat are likely to be reduced from existing conditions (i.e., the No Action Alternative) but greater than Alternative B. In regard to BLM vegetation goals (see Section 4.10), with implementation of mitigation as described below, Alternative C has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, impacts of new development on common vegetation communities that do not support special-status species would be minor, whereas new surface disturbance in sensitive vegetation types such as riparian communities or vernal pools could have major effects to vegetation and habitat. These resources could be located within existing oil and gas fields, or within the other areas identified as open and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative C, measures to minimize impacts on vegetation communities and habitat would continue to be applied to oil and gas leases. These measures are lease stipulations, BMPs and SOPs, and general mitigation as described in Section 4.10.2. As noted above under Alternative B, site-specific analysis of potential impacts to vegetation resources would be required to develop site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative C, almost all of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.8.2) and subject to resulting impacts as discussed above. Most leases would be all or nearly all open for development. These leases do not include any lands designated as Wilderness, WSAs, Clear Creek Serpentine ACEC, or Fort Ord National Monument. Of the total lease area of approximately 17,600 acres, approximately 99.5 percent would be open and less than 0.5 percent would be closed or open with NSO. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

Impacts and mitigation within these leases would be the same as described for the Planning Area as a whole (Section 4.10.2).

4.10.6 Impacts of Alternative D

Under Alternative D, Federal mineral estate underlying BLM surface estate would be open. Split estate lands would be closed. The Ciervo Panoche Natural Area would be closed. Areas closed under the 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). All lands open to leasing would have CSU stipulations, described under Alternative B. NSO stipulations would apply to ACECs and R&PP leases. The NSO stipulation prohibits any surface disturbance on the lease land.

Under Alternative D, approximately 16 percent of BLM oil and gas Federal mineral estate is identified as open to oil and gas leasing and subject to impacts as described in Section 4.10.2. Approximately 83 percent would be closed to leasing and 1 percent would be subject to NSO stipulations, which would eliminate surface disturbance and potential for interactions between oil field activities and biological resources in these areas.

Potential impacts would vary depending on site-specific factors, such as the type of native vegetation and habitat present and the extent and location of oil and gas development disturbance. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources on critical habitat and special status split estate lands. No oil and gas development would occur and there would be no impacts to biological resources in the Ciervo Panoche Natural Area.

Depending on where new oil and gas leases are located, the impacts of Alternative D on vegetation and habitat are likely to be considerably reduced from existing conditions (i.e., the No Action Alternative), and somewhat reduced from Alternative C, but greater than Alternative D. In regard to BLM vegetation goals (see Section 4.10), with implementation of mitigation as described below, Alternative D has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, impacts of new development on common vegetation communities that do not support special-status species would be minor, whereas new surface disturbance in sensitive vegetation types such as riparian communities or vernal pools could have major effects to vegetation and habitat. These resources could be located within existing oil and gas fields or areas identified as open, and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative D, measures to minimize impacts on vegetation communities and habitat would continue to be applied to oil and gas leases. These measures are lease stipulations, BMPs and SOPs, and general mitigation as described in Section 4.10.2. As noted above under Alternative B, site-specific analysis of potential impacts to vegetation resources would be required to develop site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative D, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.9.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. One lease would be entirely open; one would be entirely closed. Most leases would have a mixture of open and closed areas. All leases in the Ciervo Panoche Natural Area would be closed. The leases do not include any lands designated as Wilderness, WSAs, Clear Creek Serpentine ACEC, or Fort Ord National Monument. Of the total lease area of approximately 17,600 acres, 25 percent would be open areas and 75 percent would be closed.

Impacts and mitigation within these leases would be the same as described for the Planning Area as a whole (Section 4.10.2).

4.10.7 Impacts of Alternative E

Under Alternative E, Federal mineral estate outside California DWR Bulletin 118 groundwater basins and sub-basins would be open, while Federal mineral estate within these basins would be closed. Areas closed under the 2007 RMP would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). All lands open to leasing would have CSU stipulations, as described under Alternative B. NSO stipulations would apply to certain Hydrologic Units and areas within 0.25 miles of non-impaired, perennial surface waters and Wild and Scenic Rivers (See Chapter 2).

Under Alternative E, approximately 63 percent of BLM oil and gas Federal mineral estate is identified as open to oil and gas leasing and subject to impacts as described in Section 4.10.2. Approximately 12 percent would be closed to leasing and 26 percent would be subject to NSO stipulations, which would eliminate surface disturbance and potential for interactions between oil field activities and biological resources in these areas.

Potential impacts would vary depending on site-specific factors, such as the type of native vegetation and habitat present and the extent and location of oil and gas development disturbance. Impacts would occur only outside California DWR Bulletin 118 groundwater basins and sub-basins and the other lands that would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources within specified Hydrologic Units and within 0.25 miles of non-impaired, perennial surface waters and Wild and Scenic Rivers, and avoid and minimize impacts to these types of waters and associated wetlands.

Depending on where new oil and gas leases are located, the overall impacts of Alternative E on vegetation and habitat are likely to be reduced from existing conditions (i.e., the No Action Alternative), but may be similar to or greater to impacts of Alternatives B, C, and D. Impacts of Alternative E on waters and associated wetlands are likely to be reduced from existing conditions and the other alternatives. In regard to BLM vegetation goals (see Section 4.10), with implementation of mitigation as described below, Alternative E has the potential to result in short-term and temporary and long-term and permanent adverse impacts that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, impacts of new development on common vegetation communities that do not support special-status species would be minor, whereas new surface disturbance in sensitive vegetation types such as riparian communities or vernal pools could have major effects to vegetation and habitat. These resources could be located within existing oil and gas fields, or within open areas as identified in the alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative E, measures to minimize impacts on vegetation communities and habitat would continue to be applied to oil and gas leases. These measures are lease stipulations, BMPs and SOPs, and general mitigation as described in Section 4.10.2. Site-specific analysis of potential impacts to vegetation resources would be required to develop site-specific mitigation measures to avoid and minimize impacts to biological resources and certain types of waters and associated wetlands.

Leases Subject to Settlement Agreement

Under Alternative E, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.10.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development or subject to NSO stipulations. Some entire leases would be open for development; one lease would be entirely within the NSO stipulation area. Most leases would have a mixture of open and

closed areas and some would have NSO stipulations on part of the areas. These leases do not include any lands designated as Wilderness, WSAs, Clear Creek Serpentine ACEC, or Fort Ord National Monument. Of the total lease area of approximately 17,600 acres, 57 percent would be open areas, 2 percent would be closed, and 41 percent would be open with NSO.

Impacts and mitigation within these leases would be the same as described for the Planning Area as a whole (Section 4.10.2).

4.11 Biological Resources – Wildlife Habitat

4.11.1 Introduction

This section discusses impacts on wildlife species and their habitats, along with applicable mitigation. Special status wildlife species are addressed in Section 4.12 of this document.

In analyzing management actions, the RMPA EIS addresses key species and their habitats. Key species include those of economic interest (e.g., native and non-native game animals); species or groups that serve as indicators of ecosystem health or the effects of management activities; and sensitive, rare, threatened, and endangered (RTE) species. See Section 3.11 for a discussion of game and indicator species. RTE wildlife species are addressed in Section 4.12 of this document.

BLM Wildlife Goals

The ROD (BLM, 2007) lists goals and objectives that define the desired future conditions for the resource. The goal for fish and wildlife is to ensure diverse, structured, resilient, and connected habitat on a landscape level to support viable and sustainable populations of wildlife, fish, and other aquatic organisms.

To achieve the goal for fish and wildlife, the following objectives are established:

- Maintain or enhance viable, healthy, and diverse populations of native and desired species, including special status species, where appropriate.
- Conserve habitat consistent with the *Installation-wide Multispecies Habitat Management Plan for Former Fort Ord, California.*
- Conserve habitat for migratory birds and species listed on the USFWS list of Birds of Conservation Concern.

Methods of Analysis

The analysis of direct and indirect effects is focused on species, populations, and habitats within the Planning Area. Direct impacts are the direct or immediate effects of an action on biological resources. Examples of direct impacts to wildlife and habitat include mortality, injury, or displacement of animals; removal or degradation of native habitat; interference with fish and wildlife movement or migration; disruption of essential wildlife behaviors such as feeding, breeding, and sheltering; and disturbance to animals and habitat from noise, light, or dust. Indirect impacts are those effects that are caused by or will result from the action, later in time or farther removed in distance, but are still reasonably certain to occur. Examples of indirect effects to native habitat and vegetation include erosion, sedimentation, and introduction of invasive species that may compete with native species and cause habitat degradation. An example of an indirect effect to fish and wildlife is increased predation due to certain habitat alterations (e.g., perch sites or "subsidies" for predators). See Section 4.10.1 for a complete description of analysis methodology.

Generalized impacts from oil and gas development, including hydraulic fracturing and other well stimulation techniques, are common to all alternatives. These generalized impacts are presented below. The impact discussion presented for each alternative focuses on the particular impacts of that alternative and builds on the discussion of generalized impacts that would occur under all alternatives.

Assumptions

The term habitat refers to the environment and ecological conditions where a species is found. One major component of most wildlife habitat is vegetation. Vegetation reflects many aspects of habitat, including regional climate, physical structure, and biological productivity and food resources for many wildlife species. Thus, vegetation is a useful overarching descriptor for habitat, and it is the primary factor in this

analysis of impacts to wildlife habitat. Impacts to vegetation communities and habitat are discussed in Section 4.10 and the particular impacts to wildlife and habitat of each alternative would be generally similar to those discussed in Section 4.10, as would applicable mitigation. The assumptions used in this impact analysis are listed in Section 4.10.

Management Actions

The ROD (BLM, 2007) listed a number of land use management actions to address identified issues, management concerns, and current and projected future uses of the lands administered by the CCFO in the Planning Area. The management actions that may be relevant to oil and gas development include, but are not limited to the following. The applicable areas for each management action are noted in parentheses at the end of each description.

- **HAB-C2.** Limit disturbance, within a distance of up to 0.5 miles of nesting special status raptors (e.g., California condor, bald eagle, golden eagle, Swainson's hawk, sharp-shinned hawk, northern harrier, peregrine falcon, and burrowing owl) during courtship, nest building, incubation, and fledging periods. Limit disturbance to other raptor species, including State species of concern (e.g., osprey, sharp-shinned hawk, northern harrier, ferruginous hawk, prairie falcon, short-eared owl, long-eared owl) and common species (e.g., red-tailed hawk and American kestrel) during critical periods of their reproductive cycle on a case-by-case basis (all management areas).
- **HAB-COM3.** Mitigate or relocate man-made barriers that substantially impede migration outside of wildlife travel corridors, as appropriate (Central Coast Management Area).

Lease Stipulations

Lease stipulations are used to protect resource values. See discussion in Section 2.5.1. Controlled Surface Use (CSU) stipulations mean that use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operation constraints that may modify the lease rights. The specific constraints would be applied based on the biological resources present and may include provisions to address protected species; sensitive species; critical habitat; raptors; or priority species, plant communities, and habitat. The No Surface Occupancy (NSO) stipulation prohibits any surface disturbance on the lease land.

BMPs and SOPs

Leasing fluid mineral resources does not confer on the lessee the right to conduct any ground disturbing activities related to exploring for or developing the resources until a subsequent environmental analysis of the actual proposed operations for the site is conducted. There are various stages of fluid minerals resource development after leasing, such as exploration, development, production, and reclamation/ closeout. These activities all require additional BLM authorization. All drilling or operations for fluid minerals production proposed to be conducted on an existing lease must be approved before surface disturbance is allowed. Surface disturbance is proposed in Applications for Permit to Drill (APDs), Rights-of-Way (ROWs), and Sundry Notices. During BLM NEPA review of these applications, site-specific appropriate mitigation/environmental protection measures are developed and approved prior to conducting ground disturbing activities. This sequential approval process (leasing, operations plan approval, etc.) allows BLM to consider application of restrictions at the appropriate action level. Restrictions are formulated at the proper stage when site-specific information is available.

BMPs and SOPs are land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to provide the most effective, environmentally sound, and economically feasible means of managing an activity and mitigating its impacts. SOPs are the management controls and performance standards required for implementation of a specific type of action.

These practices are intended to protect and enhance natural resources that could be affected by management actions. Interdisciplinary site-specific analysis is necessary to determine which management practices would be necessary to meet specific goals.

BMPs are selected and implemented as necessary, based on site-specific conditions, to meet a variety of resource objectives for specific management actions. Additional BMPs or modifications may be identified to minimize the potential for negative impacts when evaluating site-specific management actions through an interdisciplinary process. In addition, implementation and effectiveness of BMPs need to be monitored to determine whether the practices are achieving resource objectives and accomplishing desired goals, and adjustments made as necessary.

The BMPs and SOPs for this RMPA (Appendix D: Sections 1.2 through 1.6, and 1.8) include a number of measures that would reduce impacts to wildlife. The topics addressed are briefly summarized in Section 4.10.2; additional topics specific to wildlife are included below. See Appendix D for complete text of measures.

- Use seasonal restrictions to protect nesting raptors.
- Construct facilities and structures in conformance with wildlife protection guidelines. Design new facilities with measures to reduce hazards to wildlife.
- Provide excavations, trenches, and troughs with wildlife escape ramps. Cover pipe ends. Check for and remove trapped animals.
- Store trash and food items in closed containers and remove from the site regularly. Maintain neat and orderly sites and remove junk and trash.
- Prohibit firearms and pets in work sites.
- Screen or eliminate exposed oil sumps. Design tanks, pits, and secondary containment to prevent wildlife entry.
- Allow access to work sites for CDFW and USFWS biologists and law enforcement personnel.
- Avoid burrows and dens during geophysical exploration.

4.11.2 Impacts Common to All Alternatives

Under the Reasonably Foreseeable Development (RFD) Scenario for oil and gas development on Federal mineral estate in the Planning Area, within the next 15 years there is expected to be zero to 32 new development wells, most likely within the existing Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields but potentially occurring anywhere that is open to oil and gas leasing; 3 to 5 exploratory wells outside existing fields, most if not all in areas of high oil and gas occurrence potential; and geophysical exploration. Surface disturbance of up to 206 acres is expected to be associated with this development. A portion of this disturbance may be within previously disturbed areas. Areas of high oil and gas occurrence potential (Appendix B, RFD Scenario Figure 4) generally correspond to identified oil and gas plays within the San Joaquin and Salinas Basins.

Oil and gas leasing would have short-term and long-term direct and indirect effects on wildlife and habitat if new or existing leases are developed. Geophysical exploration would result in many of the same impacts as other oil and gas activities but often results in only short-term impacts on biological resources if the ground disturbance is confined to previously disturbed areas or to grasslands or similar habitats where natural recovery occurs within a short time span, without additional restoration efforts.

Site preparation and other work associated with oil and gas development could cause displacement or mortality of fish and wildlife on the site. Animals would generally leave, or attempt to leave, during grading or clearing. Many small mammals and reptiles, as well as nestling birds or eggs, could be crushed by equipment. Other animals, including adult fish or birds, generally would flee the site where they may be

subject to further adverse effects, potentially including mortality. They would be at increased risk of predation as they flush from cover during site clearing. After leaving their home territories, displaced animals may be unable to find suitable food or cover in new, unfamiliar areas. They may find themselves within the occupied territory of another individual of the same or similar species, leading to competition for resources and reduced survivorship or breeding success. In addition, oil and gas development may cause wildlife mortality, injury, or illness due to vehicle strikes; entrapment in trenches, pipes, or other supplies and equipment; drowning in stored water; or poisoning by ingestion or exposure to stored or spilled chemicals, including exposure to produced water or flowback water.

Noise and disturbance associated with oil and gas development activities may result in wildlife avoiding otherwise suitable habitat on or near work sites, leading to indirect habitat loss (Beckmann et al., 2012; Sawyer et al., 2006; Doherty et al., 2008; Bayne et al., 2008). Wildlife that remain in habitat exposed to noise and disturbance may experience physiological stress, which can affect disease resistance, survival, and reproductive success (Kight and Swaddle, 2011). Noise can also disrupt behavior, such as predator avoidance and communication, which can affect survival and reproduction (Habib et al., 2007; Francis and Barber, 2013). Noise and disturbance may also affect ecosystem structure and diversity by impacting wildlife that pollinate flowers and disperse seeds (Francis et al., 2012).

Artificial lighting may be required for oil and gas development and can disorient wildlife, leading migrating or dispersing animals off-course. Lit structures can be a collision hazard for birds. Lighting can also disrupt circadian (24-hour) rhythms, potentially affecting mating behavior, nocturnal visual communication, competition, and predation (Longcore and Rich, 2004).

Oil and gas development activities could interrupt fish or wildlife movement routes, cause habitat fragmentation, or contribute to existing habitat fragmentation at multiple geographic scales. New barriers to wildlife movement, such as roads or fences, could interrupt local biological connectivity. Culverts or other structures at stream crossings could impair fish movement upstream and downstream.

Habitat fragmentation occurs when development or other disturbance divides habitat that was once continuous into separate and smaller sections. This affects wildlife movement and the viability of the habitat to support various species. Fragmentation also increases the proportion of disturbed edge habitat to undisturbed interior habitat (edge effect) (Wilcove et al., 1986). Habitat fragmentation resulting from development of well pads, roads, and other infrastructure may cause a shift in wildlife species composition. Fragmentation favors common habitat generalists, such as raccoon (*Procyon lotor*) and American crow (*Corvus brachyrhynchos*), over more specialized, and typically rarer, species (Brittingham, no date). Development may result in a shift in biological diversity and local declines in some fish and wildlife populations (Gilbert and Chalfoun, 2011; Ingelfinger and Anderson, 2004).

Many oil and gas development activities located on operating well pads or other production-related disturbed lands and heavily disturbed sites would generally have less effect on fish or wildlife movement and habitat fragmentation than activities within or adjacent to natural habitat. Short-term and temporary effects, such as temporary construction fencing, generally would not have important or lasting effects on wildlife movement and habitat fragmentation. Oil and gas development activities would not substantially affect fish or wildlife movement or habitat fragmentation if they meet the following criteria:

- Activities are located outside any designated linkage area (as recognized by BLM, CDFW, or other resource agency, local agency, or regional conservation plan);
- The work site is surrounded by sufficient natural open space accessible to terrestrial wildlife including large mammals, small mammals, reptiles, and amphibians, such that project-related habitat conversion or fencing would not substantially interfere with local wildlife movement; and
- Activities do not include stream crossing alterations or other potential impairments to fish movement.

Alternatively, oil and gas development activities may be located entirely or partially on open space lands or in areas identified as important biological linkages or "corridors," potentially including sensitive wetland, riparian, or aquatic habitats. Substantial wildlife movement and habitat fragmentation impacts would be most likely for oil and gas development activities located outside of existing oil and gas fields, or located in operating fields where production-related land uses are intermixed with native habitats. For oil and gas development activities within recognized biological linkages, or located in habitat "corridors," habitat conversion, fencing, or other project effects may affect local wildlife movement, or require culvert or other stream crossings. These effects may be substantial without mitigation. See Section 4.10.2 for a discussion regarding the effects of climate change on vegetation and habitat, including to biological connectivity.

Oil and gas development activities could contaminate surface water or groundwater if a project causes well stimulation fluids, hydrocarbons, or other project-related contaminants including enhanced oil recovery to enter surface water or groundwater. Project-related materials that could contaminate surface water include, but are not limited to drilling fluid ("drill mud"), hydraulic fracturing fluids, produced water, crude oil, methane or other dissolved gases, crude oil mixed with hydraulic fracturing fluid or produced water, chemicals used in well-related and other activities, and fuels, lubricants, or other fluids that could leak from equipment. Potential contamination may result from spills on the site or away from the site (e.g., during transportation of project materials or wastewater, or from pipeline failure).

Project-related contaminants may be toxic to plants, fish, or wildlife. For example, drilling fluids may contain biocides, anti-corrosives, clarifiers, heavy metals, petroleum hydrocarbons, and brine. Additionally, produced water has high salinity and electrical conductivity, which can be harmful to wildlife and aquatic species that inhabit freshwater streams. In addition to elevated levels of mineral salts, produced water generally contains traces (1 to 3 percent) of petroleum oil, organic acids and elevated concentrations of heavy metals (including barium, cadmium, chromium, lead, copper and nickel). Since there are trace amounts of oil in the produced water, polycyclic aromatic hydrocarbons (PAH) and benzene, toluene, ethylbenzene and xylene (BTEX), some of which are carcinogens, are usually detected in produced water. If produced water is absorbed into stream sediments, it may cause longer-term impacts to biota. Produced water cannot be contained by traditional oil spill response methods, (e.g., containment boom and sediment berms); therefore, if spilled, it may flow further downstream and soak deeper into sediments than crude oil. If these fluids or dissolved gases enter surface water or groundwater, they may affect plants, fish, wildlife, and habitat that come into contact with them. Effects of contact with toxic chemicals can include damage to or mortality of plants, and distress, impaired health, abnormality, reproductive harm, or mortality of animals (Adams, 2011; Papoulias and Velasco, 2013; Gentes et al., 2007).

In addition to potential hazards of industrial fluids, crude oil is deleterious to wildlife. For example, birds are harmed by dermal exposure (oiling of feathers), ingestion, and effects on embryos when oil contacts egg shells. Oil on feathers causes the loss of water repellency and insulation, which may result in hypothermia or hyperthermia. In addition, oiled feathers may reduce buoyancy, and in severe cases, a bird may lose the ability to fly, dive, swim, feed, or escape predators. Ingestion of even a small amount (0.002 kg) of crude oil can have negative effects including a decrease in fertilization, egg laying, and hatching rates. A laboratory study showed that one drop of oil applied to the outside shell on an incubating egg causes high levels of mortality in a variety of birds (developing embryos obtain oxygen and disperse carbon dioxide through the porous shells). A slightly oiled bird can deliver this small quantity of oil to its clutch. The primary causes of wildlife mortality and morbidity by crude oil exposure are the physical effects of oil exposure to skin, fur, and feathers (loss of water repellency and insulation) and the resulting hypothermia or hyperthermia, as well as irritation of skin, oral, ocular, respiratory, and gastrointestinal mucous membranes. In addition, exposure to oil may damage the reproductive system, liver, and kidneys. Suppression of the immune response and disruption or inhibition of red blood cell formation has also been noted.

Surface water contamination, if any, could affect fish, wildlife, or other aquatic and wetland resources at the contamination site or downstream. Potential effects to biological resources include attraction and ingestion by wildlife, direct toxicity to fish, or damage to plant roots or physiology if the contaminant is taken up by plants. Spilled fluids, or returned fluid mixed with oil, probably would not behave in the same way as oil (i.e., the fluids would generally be water soluble, whereas oil would not).

Groundwater contamination, if any, could affect these resources at natural seeps or springs where the groundwater source discharges to the surface. Or, groundwater contamination could affect biological resources if a groundwater well is used as a water source for wetlands, fisheries, or other wildlife benefits (e.g., a water source for managed wetlands or for wildlife drinking). The actual distance to seeps, springs, or wells that could be affected will be site-specific, dependent on the groundwater resource extent and flow characteristics.

Potential surface water and groundwater quality impacts are described in Section 4.7 (Groundwater Resources) and Section 4.8 (Surface Water Resources). The operator must comply with all applicable regulations regarding storage and handling of project-related contaminants.

Potential air quality impacts are described in Section 4.5 (Air Quality). Air pollution generated by oil and gas development activities may also affect the health of plants and wildlife. The operator must comply with all applicable regulations regarding air quality.

General Mitigation

Under all alternatives, BLM management actions to conserve, restore, and enhance biological resources, including wildlife and habitat, would continue to be implemented. These proactive measures include direction to retain and acquire important native habitat; to implement recovery plans and secure areas important for recovery (e.g., compensation lands); maintain, enhance, and restore native habitat and native populations, including riparian and sensitive species; maintain linkage between areas of natural habitat; improve the knowledge base of the species and lands under BLM management; and manage all public lands appropriately. In addition, the designation of special areas with high biological value as Areas of Conservation Concern (ACECs) and Special Management Areas (SMAs) would establish management objectives and use restrictions that would help protect important biological resources from human activities and would result in the long-term maintenance of high-quality habitat across the landscapes where BLM surface lands occur.

Restrictions on certain activities to minimize impacts on biological resources, including wildlife habitat, would continue to be imposed. These include such protective measures as BMPs and Standard Operating Procedures SOPs for oil and gas development and the closure of sensitive areas to oil and gas development. All of these actions would benefit native populations and habitats at the local and landscape scales by eliminating or reducing negative impacts stemming from development.

Implementation of lease stipulations, BMPs, and SOPs, would avoid and minimize impacts to biological resources. Species-specific surveys and species avoidance and habitat protection and compensation measures would minimize impacts of oil and gas development activities on special status species.

Additional Mitigation

Compensation

Within the San Joaquin Valley, for every habitat acre permanently disturbed, 3 acres are set aside as compensation. For temporary disturbance, 1.1 acre is set aside. These ratios apply within the San Joaquin Valley, with the following exceptions:

- Within the Ciervo Panoche Natural Area the compensation ratio will be 4:1 for permanent impacts.
- The compensation ratio for vernal pool habitat will be 5:1 with a replacement element.
- If a new compensation ratio becomes established for a county or species, the BLM and USFWS may modify compensation ratios.

For protected lands (such as Federal lands, State wildlife areas, conservation banks) a replacement component will be added to the compensation ratio.

Compensation of habitat must be in kind. Land used for compensation must be of equal value or better than the land impacted. The same species must be present and habitat must be of an equal or greater value. Lands used for compensation for project impacts on San Joaquin woollythreads, California jewelflower, blunt-nosed leopard lizards, and the kangaroo rats must support these species or be approved by the USFWS for these species. Lands used to compensate for impacts on a kit fox natal den must support breeding populations of kit foxes.

See Section 1.4.4 of Appendix D (Compensation) for full details.

4.11.3 Impacts of Alternative A (No Action)

See Section 4.10.3 for a discussion of the vegetation and habitat impacts of this alternative.

The impacts of Alternative A on wildlife and habitat would be identical to existing conditions. In regard to BLM wildlife goals (see Section 4.11.1), with implementation of mitigation as described below, Alternative A has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major, depending on the extent and locations of surface disturbance for exploration and development. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative A, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. Examples of these measures are oil and gas stipulations included in Appendix D of the RMP FEIS (BLM, 2006), and the BMPs and SOPs that are included in Appendix D of this RMPA.

The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing. Although primarily directed at special status species, this stipulation also has the following requirements:

- Minimize impacts to biological resources.
- Take reasonable measures required by the BLM to protect resources.
- Specialized habitats such as riparian areas, vernal pools, other wetlands, floodplains, native perennial grasses, saltbrush, and oak woodlands would be avoided by surface disturbing activities when practical and feasible alternatives exist.

General mitigation as described in Section 4.11.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to wildlife and habitat resources, avoidance of sensitive areas where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, all areas of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and would be issued (Section 2.6.2), as such the leases would subject to resulting impacts as discussed above. The lease areas total approximately 17,600 acres. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas of the leases.

Impacts and mitigation would be the same as those for the Planning Area as a whole (Section 4.11.2).

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.11.4 Impacts of Alternative B

See Section 4.10.4 for a discussion of the vegetation and habitat impacts of this alternative.

Potential impacts within existing oil and gas fields and the surrounding 0.5-mile buffers would vary depending on site-specific factors, such as the wildlife and habitat present in the field, and the extent and location of oil and gas development disturbance. All the development would be limited to the existing oil and gas fields and surrounding 0.5-mile buffers. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

The impacts of Alternative B on wildlife and habitat are likely to be substantially reduced from existing conditions (i.e., the No Action Alternative) due to limitations on the locations of future wells. Alternative B would have up to 32 wells drilled, rather than 37, because it is limited to the existing oil and gas fields and 0.5-mile buffer area and the 5 exploratory wells would not be drilled. As a result, ground disturbance associated with Alternative B would be up to 179 acres

In regard to BLM wildlife goals (see Section 4.11.1), with implementation of mitigation as described below, Alternative B has the potential to result in short-term and temporary and long-term and permanent adverse impacts to approximately 22.45 to 179 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Affected wildlife and habitat resources could be located within existing oil and gas fields, or within the surrounding 0.5-mile buffer areas. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative B, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. Examples of these measures are oil and gas stipulations (Appendix C) and the BMPs and SOPs that are included in Appendix D of this RMPA. General mitigation as described in Section 4.11.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to wildlife and habitat resources, avoidance of sensitive areas where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative B, a portion of the area of 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.7.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, 22 percent would be open and 78 percent would be closed. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

Impacts and mitigation within these leases would be to the same as those for the Planning Area as a whole (Section 4.11.2).

4.11.5 Impacts of Alternative C

See Section 4.10.5 for a discussion of the vegetation and habitat impacts of this alternative.

Potential impacts to wildlife and habitat would vary depending on site-specific factors, such as the type of native vegetation and habitat present and the extent and location of oil and gas development disturbance. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources on critical habitat and special status split estate lands. Alternative C would close lands to leasing in core population areas of the kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills (see Figure 2-3), and thus provides greater protections to this core population than Alternatives A or E.

Depending on where new oil and gas leases are located, the impacts of Alternative C on wildlife and habitat are likely to be reduced from existing conditions (i.e., the No Action Alternative) but greater than Alternative B. In regard to BLM wildlife goals (see Section 4.11.1), with implementation of mitigation as described below, Alternative C has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Wildlife and habitat resources could be located within existing oil and gas fields, or within the other areas identified as open and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative C, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. General mitigation as described in Section 4.11.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to wildlife and habitat resources, avoidance of sensitive areas where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative C, most of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.8.2) and subject to resulting impacts as discussed above. Of the total lease area of approximately 17,600 acres, approximately 99.5 percent would be open with less than 0.5 percent closed or open with NSO. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

Impacts and mitigation would be to the same as those for the Planning Area as a whole (Section 4.11.2).

4.11.6 Impacts of Alternative D

See Section 4.10.6 for a discussion of the vegetation and habitat impacts of this alternative.

Potential impacts would vary depending on site-specific factors, such as the type of wildlife and habitat present and the extent and location of oil and gas development disturbance. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources on critical habitat and special status split estate lands. No oil and gas development would occur and there would be no impacts to biological resources in the Ciervo Panoche Natural Area.

Depending on where new oil and gas leases are located, the impacts of Alternative D on wildlife and habitat are likely to be considerably reduced from existing conditions (i.e., the No Action Alternative), and somewhat reduced from Alternative C, but greater than Alternative D. In regard to BLM wildlife goals (see Section 4.11.1), with implementation of mitigation as described below, Alternative D has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Wildlife and habitat resources could be located within existing oil and gas fields or areas identified as open, and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative D, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. General mitigation as described in Section 4.11.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to wildlife and habitat resources, avoidance of sensitive areas where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative D, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.9.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. One lease would be entirely open; one would be entirely closed. Most leases would have a mixture of open and closed areas. All leases within the Ciervo Panoche Natural Area would be closed. Of the total lease area of approximately 17,600 acres, approximately 25 percent would be open and 75 percent would be closed.

Impacts and mitigation would be the same as those for the Planning Area as a whole (Section 4.11.2).

4.11.7 Impacts of Alternative E

See Section 4.10.7 for a discussion of the vegetation and habitat impacts of this alternative.

Potential impacts would vary depending on site-specific factors, such as the type of native vegetation and habitat present and the extent and location of oil and gas development disturbance. Impacts would occur only outside California DWR Bulletin 118 groundwater basins and sub-basins, and the other lands that would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources within specified Hydrologic Units (see Chapter 2) and within 0.25 miles of non-impaired, perennial surface waters and Wild and Scenic Rivers, and avoid and minimize impacts to these types of waters and associated wetlands.

Depending on where new oil and gas leases are located, the overall impacts of Alternative E on wildlife and habitat are likely to be reduced from existing conditions (i.e., the No Action Alternative), but may be similar to or greater to impacts of Alternatives B, C, and D. Impacts of Alternative E on waters and associated wetlands are likely to be reduced from existing conditions and the other alternatives. In regard to BLM wildlife goals (see Section 4.11.1), with implementation of mitigation as described below, Alternative E has the potential to result in short-term and temporary and long-term and permanent adverse impacts that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Wildlife and habitat resources could be located within existing oil and gas fields, or within open areas as identified in the alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative E, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. General mitigation as described in Section 4.11.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to wildlife and habitat resources, avoidance of sensitive areas where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to biological resources.

Leases Subject to Settlement Agreement

Under Alternative E, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.10.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development or subject to NSO stipulations. Some entire leases would be open for development; one lease would be entirely within the NSO stipulation area. Most leases would have a mixture of open and closed areas and some would have NSO stipulations on part of the areas. Of the total lease area of approximately 17,600 acres, approximately 57 percent would be open, 2 percent would be closed, and 41 percent would be open with NSO.

Impacts and mitigation would be similar to those for the Planning Area as a whole (Section 4.11.2).

4.12 Biological Resources – Special Status Species

4.12.1 Introduction

This section discusses impacts on special status plant and animal species, along with applicable mitigation. In analyzing management actions, the RMPA/EIS addresses key species and their habitats. Key species include those of economic interest (e.g., native and non-native game animals); species or groups that serve as indicators of ecosystem health or the effects of management activities; and sensitive, rare, threatened, and endangered (RTE) species. See Section 3.11 for a discussion of game and indicator species. Impacts and mitigation for non-special status wildlife species and their habitat are addressed in Section 4.11 of this document.

BLM Special Status Species Goals

The ROD (BLM, 2007) lists goals and objectives that define the desired future conditions for the special status species resource. The goal for management of special status species is to (1) protect and/or improve habitat necessary to recover populations of special status species, and (2) manage BLM surface land to maintain, restore, or enhance populations and habitat of special status fish, wildlife, and plant species.

To achieve the goal for management of special status species, the following objectives are established:

- Manage listed, proposed, or candidate threatened or endangered species to comply with the provisions of the Endangered Species Act (ESA).
- Manage special status plants consistent with BLM policy on Special Status Species Management (BLM Manual 6840).
- Prevent the need for listing proposed, candidate, and sensitive species under the ESA
- Improve the condition of special status species and their habitats to a point where their special status recognition is no longer warranted.

Methods of Analysis

The analysis of direct and indirect effects is focused on species, populations, and habitats within the Planning Area. Direct impacts are the direct or immediate effects of an action on biological resources. Examples of direct impacts to wildlife and habitat include mortality, injury, or displacement of animals; removal or degradation of native habitat; interference with fish and wildlife movement or migration; disruption of essential wildlife behaviors such as feeding, breeding, and sheltering; and disturbance to animals and habitat from noise, light, or dust. Indirect impacts are those effects that are caused by or will result from the action, later in time or farther removed in distance, but are still reasonably certain to occur. Examples of indirect effects to native habitat and vegetation include erosion, sedimentation, and introduction of invasive species that may compete with native species and cause habitat degradation. An example of an indirect effect to fish and wildlife is increased predation due to certain habitat alterations (e.g., perch sites or "subsidies" for predators). See Section 4.10.1 for a complete description of analysis methodology.

Generalized impacts from oil and gas development, including hydraulic fracturing and other well stimulation techniques, are common to all alternatives. These generalized impacts are presented below. The impact discussion presented for each alternative focuses on the particular impacts of that alternative and builds on the discussion of generalized impacts that would occur under all alternatives.

Assumptions

Impacts to wildlife and habitat are discussed in Section 4.11. The effects of each alternative to special status species habitat would be generally similar to those discussed in Section 4.11, as would applicable mitiga-

tion. The assumptions used for biological effects analysis in general are listed in Section 4.10, Vegetation. Additional assumptions used in this impact analysis include the following:

- Species-specific surveys and species avoidance and habitat protection measures would result in land use authorizations that minimize impacts on these special status species. Examples of these measures are provided below and in Appendix D – Best Management Practices and Standard Operating Procedures.
- Listed plant populations usually would be avoided by development.
- Although there may be localized effects on special status species, adjacent BLM surface lands would continue to support populations of these species, which would contribute to their conservation and recovery.
- All new oil, gas, and geothermal leases would be issued with stipulations to protect special status species and critical habitat. These stipulations would allow the BLM to move, delay, and even prohibit surface-disturbing activities on all or a portion of the lease, if necessary, to reduce impacts on biological resources to an acceptable level.
- Other actions to conserve, restore, and enhance special status species habitat would also continue to be implemented. These proactive measures include direction to retain and acquire important native habitat, especially for listed species; to implement recovery plans and secure areas important for recovery (e.g., compensation lands); to maintain, enhance, and restore native habitat and native populations, including riparian and sensitive species; to maintain linkage between areas of natural habitat; to improve the knowledge base of the species and lands under BLM management; and to manage all public lands appropriately.
- The management of special areas with high biological value as ACECs would help protect important biological resources from human activities and would result in the long-term maintenance of high-quality habitat across the landscapes where BLM surface lands occur.
- Within the Planning Area, most of the oil and gas activity is projected to occur near existing oil fields in the Monterey, Fresno, and San Benito Counties. Between 0 and 37 wells are forecast to be drilled per year. The RFD Scenario estimates that between 179 and 206 acres of surface disturbance would occur as a result of new Federal oil and gas leases. Only a portion of the disturbance would be within habitat.
- For every acre of (federally listed) special status species habitat permanently disturbed, 3 acres are set aside as compensation. For temporary disturbance, 1.1 acre is set aside. In addition, if an acre of public land that has been identified as part of the reserve and corridor system were disturbed, temporarily or permanently, an additional replacement acre would be set aside to compensate for the additional disturbance. These measures are implemented to maintain listed species habitats at the landscape scale.

Management Actions

The ROD (BLM, 2007) also lists a number of land use management actions to address identified issues, management concerns, and current and projected future uses of the lands administered by the CCFO in the Planning Area. The management actions that may be relevant to oil and gas development include, but are not limited to the following. The applicable areas for each management action are noted in parentheses at the end of each description.

- **SSS-COM2.** Monitor and maintain upland habitat for the California tiger salamander (all management areas).
- **SSS-C1.** Maintain, restore, or enhance special status species habitat (all management areas).
- **SSS-C2.** Limit proposed new surface-disturbing activities within occupied or potential habitat for special status species and significant plant communities. Limit long-term disturbances in potential habitat (all management areas).

- **SSS-C3.** Mitigate or relocate activities that disturb, alter, or interrupt hydrologic or ecological processes that support special status species (all management areas).
- **SSS-COM3.** Protect ponds, wetlands, or riparian areas known to support or that could potentially support California tiger salamander, red-legged frog, or California linderiella to maintain natural corridors between pools/wetlands and upland habitat so that continuous native plant coverage allows adequate movement of these species (Central Coast Management Area).

Lease Stipulations

Lease stipulations are used to protect resource values. See discussion in Section 2.5.1. Controlled Surface Use (CSU) stipulations mean that use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operation constraints that may modify the lease rights. The specific constraints would be applied based on the biological resources present and may include provisions to address protected species; sensitive species; critical habitat; raptors; or priority species, plant communities, and habitat. No Surface Occupancy (NSO) stipulations prohibit any surface disturbance on the lease land.

BMPs and SOPs

BMPs and SOPs are land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. See discussion in Section 4.10.2. The BMPs and SOPs for this RMPA (Appendix D: Sections 1.2 through 1.6, and 1.8) include a number of measures that would reduce impacts to wildlife. The topics addressed are briefly summarized in Sections 4.10.2 and 4.11.2; additional topics applicable to special status species are listed below; see Appendix D for complete text of measures.

- Minimize habitat disturbance and reduce the potential for take of listed species.
- Minimize activities during evening hours.
- Immediately cease project activities that are likely to cause the allowed extent of take to be exceeded.
- Extend protective measures for listed species to candidate and proposed species.
- Conduct surveys for listed species and important habitat features for listed species.

There are also species-specific BMPs and SOPs measures for certain special status species, as briefly summarized below; see Appendix D for additional details and complete text of measures. Project areas include surrounding buffers of varying sizes.

Federally Listed Species

All listed species:

- Conduct biological monitoring by BLM-approved, USFWS-qualified biologists.
- Submit monitoring and compliance reports to BLM.
- Provide in-kind compensation for impacts to listed species habitat at established ratios.
- Minimize the introduction and spread of weeds. Prohibit release of non-native animals.
- Conduct pre-activity biological surveys and implement specified impact avoidance measures during geophysical surveys. Establish no-disturbance buffers for dens, burrows, and populations of listed plants during seismic surveys.

Steelhead:

- Designate a BLM-approved third party salmonid biological monitor to oversee compliance.
- Conduct monitoring during surface-disturbing activities.
- Submit a spill prevention plan to BLM. Notify BLM of spills within 500 feet of critical habitat and implement spill response.
- Conduct worker training.

- Restrict activities to certain time periods to reduce impacts.
- Store liquids in closed containers with secondary containment. Clean up spills of hazardous liquids, and do not leave unattended until clean-up is complete. Construct containment berms. Remove materials with potential to discharge pollutants (if inundated) during high flows, spawning runs, and juvenile out-migration.
- Suspend new pipelines above the 100-year flood line at stream crossings within critical habitat.
- Submit information on stream crossing use to BLM prior to project approval. Survey for presence of salmonids prior to use of wet stream crossings.
- Use temporary structures to span streams.
- Avoid new construction in areas below the 100-year flood line in steelhead critical habitat.
- Maintain work areas free of trash and debris. Remove all chemicals, spoils, equipment, and wastes prior to November 30.
- Avoid storing spoils and materials in locations where it could be washed into a stream.
- Restrict vehicle speed to 20 mph or less on access routes and 5 mph or less in earthen stream crossings.
- Restrict equipment, materials, and personnel to disturbed areas. Avoid drainages and stream channels.
- No vehicle use outside of work areas and access routes.
- Implement appropriate fire prevention methods and fire watch.
- Prohibit firearms and pets in work areas. Prohibit feeding of wildlife.

Blunt-nosed leopard lizard:

- Survey for burrows in the project area.
- Avoid and protect burrows.
- Contact BLM if a blunt-nosed leopard lizard is observed in the project area or along access route and comply with any additional measures required by BLM.
- Conduct daily monitoring of the work area and access routes. Submit monitoring reports to BLM. Submit an Operations and Maintenance Plan describing impact avoidance measures to BLM.
- Install signage or temporary barriers to protect occupied areas near access routes. Install exclusion barriers around work sites.
- Conduct project activities at night when possible.
- Control vehicle speed. Check under vehicles and equipment prior to operation. Conduct vehicle escorts in occupied areas.
- Regularly inspect trenches and excavations for entrapped animals and provide escape ramps.

San Joaquin antelope squirrel:

- Apply measures described for blunt-nosed leopard lizard also to San Joaquin antelope squirrel.
- Implement CDFW-approved measures to avoid take.

Giant kangaroo rat:

- Survey for burrow precincts (i.e., burrow complexes) in the project area. Implement a no-disturbance buffer around burrow precincts.
- Implement a capture and release program, as required by USFWS and BLM.

California condor:

- Restrict activities to certain time periods to reduce impacts.
- Designate a representative to oversee compliance.
- Conduct worker training.
- Keep work areas free of trash, microtrash, debris, and other hazards, or secure in closed containers. Cover or bury hoses and cords.
- Avoid direct contact with condors.
- Store all liquids in closed containers. Clean up spills of hazardous liquids and do not leave unattended until clean-up is complete.

- Avoid use of ethylene glycol based antifreeze. Check any vehicles with ethylene glycol–based antifreeze for leaks daily.
- Restrict vehicle speed to 20 mph or less.
- No vehicle use outside of work areas and access routes.
- Restrict equipment, materials, and personnel to disturbed areas that are not habitat for listed species.
- Prohibit firearms and pets in work areas. Prohibit feeding of wildlife.
- Implement appropriate fire prevention methods and fire watch.
- Obtain approval from USFWS prior to use of aircraft or flaring of flammable gases or substances at the project site.
- Report use of the project site and associated facilities by condors to BLM. Report any take of condors (e.g., harm, harassment, injury, death) to USFWS and BLM. Immediately cease activity that caused take.
- Install barriers around well cellars and secondary containment to prevent condor access.
- Use stainless steel rather than poly chemical lines.
- Attach landing deterrents to walking beams on pumping units.
- Install perimeter fencing to deter condor access.
- Install information signs regarding microtrash.
- Install bird deflectors on power lines. Design power lines with sufficient separation to prevent electrocution of condors. Avoid citing power lines on ridgelines or spanning canyons.

San Joaquin kit fox:

- Survey for dens in the project area.
- Protect dens and establish no-disturbance buffers. Employ passive relocation of non-natal dens.
- Conduct blasting, seismic surveys, and other non-fatal disturbance outside of breeding season.
- Search pipes and culverts before sealing to ensure no kit fox are entrapped.

San Joaquin woollythreads and California jewelflower:

- Survey in the project area during appropriate season and environmental conditions.
- Avoid extant populations. Fence or flag populations to prevent accidental encroachment.
- Avoid herbicide use within 300 feet of populations.

Federal Proposed, Federal Candidate, and State Listed Species

- Survey for important habitat features in the project area (animals).
- Survey in the project area during appropriate season (plants).
- Conduct pre-activity biological surveys prior to geophysical surveys. Implement specified impact avoidance measures for geophysical surveys.

Other Special Status Species

- Conduct pre-activity biological surveys prior to geophysical surveys. Implement specified impact avoidance measures for geophysical surveys. Establish no-disturbance buffers for badger dens and burrowing owl burrows during seismic surveys.

Additional Mitigation

Compensation

Within the San Joaquin Valley, for every habitat acre permanently disturbed, 3 acres are set aside as compensation. For temporary disturbance, 1.1 acre is set aside. These ratios apply within the San Joaquin Valley, with the following exceptions:

- Within the Ciervo Panoche Natural Area the compensation ratio will be 4:1 for permanent impacts.
- The compensation ratio for vernal pool habitat will be 5:1 with a replacement element.

If a new compensation ratio becomes established for a county or species, the BLM and USFWS may modify compensation ratios.

For protected lands (such as Federal lands, State wildlife areas, conservation banks) a replacement component will be added to the compensation ratio.

Compensation of habitat must be in kind. Land used for compensation must be of equal value or better than the land impacted. The same species must be present and habitat must be of an equal or greater value. Lands used for compensation for project impacts on San Joaquin woollythreads, California jewelflower, blunt-nosed leopard lizards, and the kangaroo rats must support these species or be approved by the USFWS for these species. Lands used to compensate for impacts on a kit fox natal den must support breeding populations of kit foxes.

See Section 1.4.4 of Appendix D (Compensation) for full details.

Nesting Birds. In addition to the lease stipulations, BMPs, and SOPs summarized above, clearing of vegetation, site preparation in open areas, or other oil and gas development activities that may adversely affect breeding birds will be scheduled outside the peak nesting season (generally February 1 through August 31, but variable according to region) wherever feasible. If activities would take place during bird breeding seasons, a qualified BLM-approved biological monitor will conduct field surveys and establish appropriate no-disturbance buffers to avoid take of nesting birds.

Burrowing Owl. In addition to the lease stipulations, BMPs, and SOPs summarized above, on any proposed oil and gas development site where burrowing owl may occur, a qualified BLM-approved biological monitor will evaluate occupancy and habitat suitability for burrowing owls. If burrowing owls are present on or near the site, the applicant will implement measures to exclude burrowing owls from the site, or protect them in place throughout project implementation by designating a buffer area where project activities will be avoided.

San Benito evening-primrose. In addition to the lease stipulations, BMPs, and SOPs summarized above, on any proposed oil and gas development site where San Benito evening-primrose may occur, the following measures will apply:

Surveys for San Benito evening primrose will be conducted during the peak flowering period (April — June) during an adequate rainfall year (the grassland landscape should appear uniformly green) in the area to be disturbed by the project plus a 50-foot buffer. Conduct reconnaissance-level surveys to determine habitat suitability using meandering walk-over surveys. Conduct site-specific surveys in appropriate habitat by walking transects with 50-foot spacing. At the discretion of an approved BLM botanist, existing information may be used to conclude that the site is not occupied and surveys are not required or that project impacts are acceptable without detailed surveys.

Extant populations will be avoided, to the greatest extent practicable. The locations of listed plants will be avoided and temporarily fenced or prominently flagged to prevent inadvertent encroachment by vehicles and equipment during the activity.

Herbicide use will not be permitted within 300 feet of populations identified during pre-project surveys.

Geophysical exploration activities will avoid populations of San Benito evening-primrose to the maximum extent practicable in the growing season (from first significant rains and germination to flowering; approximately early November through June). Populations of special-status plants will be avoided by relocating and/or reconfiguring source points, receiver points and travel routes. If it becomes necessary to locate a project in an area where San Benito evening-primrose is known or thought to be present, every reasonable effort shall be made to wait until after seed set before beginning ground disturbances.

4.12.2 Impacts Common to All Alternatives

Under the Reasonably Foreseeable Development (RFD) Scenario for oil and gas development on Federal mineral estate in the Planning Area, within the next 15 years there is expected to be zero to 32 new development wells, most likely within the existing Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields, but potentially occurring anywhere that is open to oil and gas leasing; 3 to 5 exploratory wells outside existing fields, most if not all in areas of high oil and gas occurrence potential; and geophysical exploration. Surface disturbance of 22 to 206 acres is expected to be associated with this development. A portion of this disturbance may be within previously disturbed areas. Areas of high oil and gas occurrence potential (Figure 4 of the RFD Scenario, Appendix B) generally correspond to identified oil and gas plays within the San Joaquin and Salinas Basins. See Appendix B for details.

Oil and gas leasing would have short-term and long-term direct and indirect effects on special status species if new or existing leases are developed. Geophysical exploration would result in many of the same impacts as other oil and gas activities, but generally results in short-term impacts on biological resources.

Oil and gas development activities could affect special status fish, wildlife, or plants, including federally listed endangered or threatened species and BLM sensitive species, depending on the specific location of the activities and their on-site and off-site habitat effects. See Table 3.12-1 for the definition of special status species, as used in this document.

Examples of adverse effects to endangered, rare, or threatened plants include grading or mowing plants during site preparation or other ground-disturbing activities; soil compaction or other habitat effects that may prevent seeds from germinating or becoming established; alterations to upstream or downstream site hydrology, leading to alteration of special-status plant habitat (e.g., removing surface or soil water source, or causing inundation of an upland species occurrence); introduction or spread of invasive species that may compete with rare plants or alter natural processes; or introduction of substantial dust from project activities, interfering with plant physiology.

Direct or indirect impacts to special status wildlife include take, mortality, injury, loss or degradation of occupied habitat, or disturbance that may affect normal behavior patterns such as breeding, feeding, sheltering, migration, or dispersal. Wildlife, including special status wildlife, could be exposed to hazards such as vehicle strikes, nest disturbance, entrapment, collision, electrocution, and hazardous materials.

Other potential impacts to special status species would be similar to those discussed in Sections 4.10 and 4.11. Additional impact information for certain special status species is provided below.

California condor

The Planning Area is within the range of the California condor. Condors can be harmed by ingesting oilfield materials, including oil, vehicle coolant, chemicals, and trash. Condors can collide with structures and power lines. Habituation to humans can increase the likelihood of human-condor interactions. Noise from activities can disrupt roosting and nesting behavior, and place condor chicks at risk. Condors can become coated with oil from well cellars, leaks, and spills or become entangled in equipment or fences. While these impacts may occur at a local scale, they may impact condor populations across the larger landscape where these birds occur. The impacts may be short-term or long-term depending on the extent of impacts and condor population levels and population trends.

San Joaquin Valley species

The Planning Area includes portions of the San Joaquin Valley. Some of the federally listed or BLM sensitive species in this area are San Joaquin woollythreads, California jewelflower, San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, and San Joaquin antelope squirrel.

Oil and gas development affects special status species by habitat loss due to vegetation removal and grading for well pads, roads, and other facilities. Noise and vibration, venting of toxic and noxious gases, and release of petroleum products and wastewaters result in habitat degradation. Injury and mortality may result from vehicle strikes, entrapment, and drowning in oil sumps or wastewater ponds.

Ecological communities in San Joaquin Valley saltbush scrub may remain relatively intact with low to medium levels of oil field development. At higher levels of development, greater structural diversity due to facilities and plantings, greater amount of edge habitat, and the availability of water create habitat that is occupied by common, opportunistic species rather than special status endemic species (Fiehler and Cypher, 2011). Low and moderate levels of development could sustain suitable habitat for San Joaquin kit fox, and other special status species, as long as suitable mitigation policies are observed, while high-density development areas become unsuitable or are largely avoided (Fiehler and Cypher, 2011; USFWS, 1998).

General Mitigation

Under all alternatives, BLM management actions to conserve, restore, and enhance biological resources, including special status species, would continue to be implemented. These proactive measures include direction to retain and acquire important native habitat, especially for listed species; to implement recovery plans and secure areas important for recovery (e.g., compensation lands); to maintain, enhance, and restore native habitat and native populations, including riparian and sensitive species; to maintain linkage between areas of natural habitat; to improve the knowledge base of the species and lands under BLM management; and to manage all public lands appropriately. In addition, the designation of special areas with high biological value as Areas of Conservation Concern (ACECs) and Special Management Areas (SMAs) would establish management objectives and use restrictions that would help protect important biological resources from human activities and would result in the long-term maintenance of high-quality habitat across the landscapes where BLM surface lands occur.

Restrictions on certain activities to minimize impacts on biological resources, including special status species, would continue to be imposed. These include such protective measures as Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) for oil and gas development and the closure of sensitive areas to oil and gas development. All of these actions would benefit native populations and habitats at the local and landscape scales by eliminating or reducing negative impacts stemming from development.

Implementation of lease stipulations, BMPs, and SOPs, and additional mitigation would avoid and minimize impacts to biological resources. Species-specific surveys and species avoidance and habitat protection and compensation measures would minimize impacts of oil and gas development activities on special status species.

4.12.3 Impacts of Alternative A (No Action)

See Sections 4.10.3 and 4.11.3 for discussion of the vegetation and wildlife habitat impacts of this alternative.

The impacts of Alternative A on special status species would be identical to existing conditions. In regard to BLM special status species goals (see Section 4.12.1), with implementation of mitigation as described below, Alternative A has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major, depending on the extent and locations of surface disturbance for exploration and development. For example, new development on disturbed sites within developed oil and gas fields that are not within habitat occupied by special status species would be minor, whereas new surface disturbance in occupied habitat could have major effects to special status species. Site-specific analysis would be required to determine actual impacts. However, lease stipulations (and mitigation measures at the project level) are designed to avoid or minimize potential effects on these resources.

Mitigation

Under Alternative A, measures to minimize impacts on wildlife and habitat would continue to be applied to oil and gas leases. Examples of these measures are oil and gas stipulations included in Appendix D of the RMP FEIS (BLM, 2006) and the BMPs and SOPs in Appendix D of this RMPA.

The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas open to leasing. Although primarily directed at special status species, this stipulation also has the following requirements:

- Minimize impacts to biological resources.
- Take reasonable measures required by the BLM to protect resources.
- Specialized habitats such as riparian areas, vernal pools, other wetlands, floodplains, native perennial grasses, saltbrush, and oak woodlands would be avoided by surface disturbing activities when practical and feasible alternatives exist.

General mitigation as described in Section 4.12.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to special status species, avoidance of occupied habitat where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to special status species.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, all areas of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and development and would be issued (Section 2.6.2), as such the leases would be subject to resulting impacts discussed above. The lease areas total approximately 17,600 acres. The Endangered Species stipulation from the 2007 Hollister Field Office RMP would apply in all areas of the leases.

Impacts and mitigation would be the same as those for the Planning Area as a whole (Section 4.12.2).

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.12.4 Impacts of Alternative B

See Sections 4.10.4 and 4.11.4 for discussion of the vegetation and wildlife habitat impacts of this alternative.

Potential impacts within existing oil and gas fields and the surrounding 0.5-mile buffers would vary depending on site-specific factors, such as the special status species present in the field, and the extent and location of oil and gas development disturbance. All the development would be limited to the existing oil and gas fields and surrounding 0.5-mile buffers. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

The impacts of Alternative B on special status species are likely to be substantially reduced from existing conditions (i.e., the No Action Alternative) due to limitations on the locations of future wells. Alternative B would have up to 32 wells drilled, rather than 37, because it is limited to the existing oil and gas fields and 0.5-mile buffer area and the 5 exploratory wells would not be drilled. As a result, ground disturbance associated with Alternative B would be up to 179 acres.

In regard to BLM special status species goals (see Section 4.12.1), with implementation of mitigation as described below, Alternative B has the potential to result in short-term and temporary and long-term and permanent adverse impacts to 22 to 179 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, new development on disturbed sites within developed oil and gas fields that are not within habitat occupied by special status species would be minor, whereas new surface disturbance in occupied habitat could have major effects to special status species. However, lease stipulations (and mitigation measures at the project-level) are designed to avoid or minimize potential effects on these resources. Affected special status species and associated habitat could be located within existing oil and gas fields, or within the surrounding 0.5-mile buffer areas. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative B, measures to minimize impacts on special status species would continue to be applied to oil and gas leases. Examples of these measures are oil and gas stipulations (Appendix C of this RMPA) and the BMPs and SOPs that are included in Appendix D of this RMPA.

General mitigation as described in Section 4.12.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to special status species, avoidance of occupied habitat where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to special status species.

Leases Subject to Settlement Agreement

Under Alternative B, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and development (Section 2.7.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, approximately 22 percent would be open and 78 percent would be closed. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

Impacts and mitigation within these leases would be the same as those for the Planning Area as a whole (Section 4.12.2).

4.12.5 Impacts of Alternative C

See Sections 4.10.5 and 4.11.5 for discussion of the vegetation and wildlife habitat impacts of this alternative.

Potential impacts to special status species would vary depending on site-specific factors, such as the special status species present and the extent and location of oil and gas development disturbance. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources on critical habitat and special status split estate lands.

Depending on where new oil and gas leases are located, the impacts of Alternative C on wildlife and habitat are likely to be reduced from existing conditions (i.e., the No Action Alternative) but greater than Alternative B. However, approximately 35,400 acres would be closed within or in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills. The areas that are proposed for closure to leasing within Panoche, Griswold, Tumey, and Ciervo Hills areas have been selected for the protection and recovery of a core population of the federally endangered giant kangaroo rat as well as for protection and recovery of the federally endangered San Joaquin kit fox. These areas are known to contain these listed species, and the proposed closure areas in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills are intended to maintain

connectivity and movement corridors within suitable habitat for the San Joaquin kit fox. Additionally, portions of these areas are known to contain the federally endangered blunt-nosed leopard lizard.

In regard to BLM special status species goals (see Section 4.12.1), with implementation of mitigation as described below, Alternative C has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, new development on disturbed sites within developed oil and gas fields that are not within habitat occupied by special status species would be minor, whereas new surface disturbance in occupied habitat could have major effects to special status species. However, lease stipulations (and mitigation measures at the project level) are designed to avoid or minimize potential effects on these resources. Special status species and associated habitat could be located within existing oil and gas fields, or within the other areas identified as open and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative C, measures to minimize impacts on special status species would continue to be applied to oil and gas leases.

General mitigation as described in Section 4.12.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to special status species, avoidance of occupied habitat where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to special status species.

Leases Subject to Settlement Agreement

Under Alternative C, most of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and development (Section 2.8.2) and subject to resulting impacts as discussed above. Of the total lease area of approximately 17,600 acres, approximately 99.5 percent would be open with less than 0.5 percent closed or open with NSO. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. Impacts and mitigation would be to the same as those for the Planning Area as a whole (Section 4.12.2).

4.12.6 Impacts of Alternative D

See Sections 4.10.6 and 4.11.6 for discussion of the vegetation and wildlife habitat impacts of this alternative.

Potential impacts would vary depending on site-specific factors, such as the special status species present and the extent and location of oil and gas development disturbance. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources in ACECs and R&PP leases. Under Alternative D, closure of the Ciervo Panoche Natural Area to oil and gas development would avoid impacts to the special status species found in that area, including San Joaquin woolly threads (*Monolopia congdonii*), San Joaquin kit fox (*Vulpes macrotis mutica*), giant kangaroo rat (*Dipodomys ingens*), and blunt-nosed leopard lizard (*Gambelia sila*).

Depending on where new oil and gas leases are located, the impacts of Alternative D on special status species are likely to be considerably reduced from existing conditions (i.e., the No Action Alternative), and somewhat reduced from Alternative C, but greater than Alternative D. In regard to BLM special status species goals (see Section 4.12.1), with implementation of mitigation as described below, Alternative D has the potential to result in short-term and temporary and long-term and permanent adverse impacts to up to 206 acres that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, new development on disturbed sites within developed oil and gas fields that are not within habitat occupied by special status spe-

cies would be minor, whereas new surface disturbance in occupied habitat could have major effects to special status species. However, lease stipulations (and mitigation measures at the project-level) are designed to avoid or minimize potential effects on these resources. These resources could be located within existing oil and gas fields, or within the other areas identified as open and without the NSO stipulation under this alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative D, measures to minimize impacts on special status species would continue to be applied to oil and gas leases.

General mitigation as described in Section 4.12.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to special status species, avoidance of occupied habitat where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to special status species.

Leases Subject to Settlement Agreement

Under Alternative D, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and development (Section 2.9.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Most leases would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, open areas would be approximately 25 percent and closed areas 75 percent.

Impacts and mitigation would be the same as those for the Planning Area as a whole (Section 4.12.2).

4.12.7 Impacts of Alternative E

See Sections 4.10.7 and 4.11.7 for discussion of the vegetation and wildlife habitat impacts of this alternative.

Potential impacts would vary depending on site-specific factors, such as the special status species present and the extent and location of oil and gas development disturbance. Impacts would occur only outside California DWR Bulletin 118 groundwater basins and sub-basins and the other lands that would remain closed (Wilderness, WSAs, Clear Creek Serpentine ACEC, and Fort Ord National Monument). CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources. NSO stipulations would avoid impacts to biological resources within 0.25 miles of non-impaired, perennial surface waters and Wild and Scenic Rivers and specified Hydrologic Units (see Chapter 2), and avoid and minimize impacts to these types of waters and associated wetlands.

Depending on where new oil and gas leases are located, the overall impacts of Alternative E on special status species are likely to be reduced from existing conditions (i.e., the No Action Alternative), but may be similar to or greater to impacts of Alternatives B, C, and D. Impacts of Alternative E on special status species associated with waters and wetlands are likely to be reduced from existing conditions and the other alternatives. In regard to BLM special status species goals (see Section 4.12.1), with implementation of mitigation as described below, Alternative E has the potential to result in short-term and temporary and long-term and permanent adverse impacts that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. For example, new development on disturbed sites within developed oil and gas fields that are not within habitat occupied by special status species would be minor, whereas new surface disturbance in occupied habitat could have major effects to special status species. However, lease stipulations (and mitigation measures at the project level) are designed to avoid or minimize potential effects on these resources. Special status species and associated habitat could be located within existing oil and gas fields, or within open areas as identified in the alternative. Site-specific analysis would be required to determine actual impacts.

Mitigation

Under Alternative E, measures to minimize impacts to special status species would continue to be applied to oil and gas leases.

General mitigation as described in Section 4.12.2 would apply. Implementation of lease stipulations, BMPs, and SOPs would require site-specific analysis of potential impacts to special status species, avoidance of occupied habitat where feasible, and development of site-specific mitigation measures to avoid and minimize impacts to special status species.

Leases Subject to Settlement Agreement

Under Alternative E, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas leasing and development (Section 2.10.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development or subject to NSO stipulations. Some entire leases would be open for development; one lease would be entirely within the NSO stipulation area. Most leases would have a mixture of open and closed areas and some would have NSO stipulations on part of the areas. Of the total lease area, open areas would be approximately 66 percent, closed areas 2 percent, and NSO areas 32 percent.

Impacts and mitigation would be similar to those for the Planning Area as a whole (Section 4.12.2).

4.13 Visual Resource Management

This Visual Resource Management section addresses the BLM's Oil and Gas Visual Resource Management (VRM) Best Management Practices (BMPs), which include utilizing the BLM's VRM system. This section describes the types of potential impacts Alternatives A through E could have on visual resources in the BLM Central Coast Field Office Planning Area (Planning Area), and it addresses the types of mitigation that could be implemented to lessen the degree of the impacts, where applicable.

4.13.1 Introduction

Approach to Impact Assessment

A visual resource impact analysis involves determining whether the potential visual impacts from proposed surface-disturbing activities or developments will meet the class management objectives established for the area or whether design adjustments will be required. This is done using BLM's VRM system and is summarized as follows. A contrast rating process is used wherein a project's features are compared with the major features in the existing landscape using the basic design elements of form, line, color, and texture. The results can be used as a guide for resolving any visual impacts. Once every attempt has been made to reduce visual impacts and inconsistencies with VRM class management objectives, BLM managers can decide whether to accept or deny project proposals. BLM Managers also have the option of attaching additional stipulations to attempt to bring the proposal into compliance with the VRM class objectives. In some cases, a VRM inconsistency may trigger the Resource Management Plan amendment process and subsequent changes in the applicable VRM management classes.

The impact analysis is based on the following assumptions:

- The public would continue to value landscape appearance as a resource to be managed in the Planning Area.
- The machinery and infrastructure associated with oil and gas activities would remain relatively unchanged over the life of the RMPA.
- Recreational use would continue to increase over the life of the RMPA, increasing the value of unmodified landscapes.
- All surface disturbance associated with oil and gas development analyzed in this Draft RMPA/EIS would occur in one area, thereby maximizing the potential visual impacts and presenting a worst-case scenario.
- Areas open to oil and gas leasing (with no stipulations and based on the current natural conditions of the areas managed as VRM Class I, II, III, and IV; see Section 3.13.4):
  - *would be inconsistent* with the VRM Class I objective;
  - *would likely be inconsistent* with VRM Class II objective;
  - *may be inconsistent* with VRM Class III objective; and
  - *would be consistent* with the VRM Class IV objective.
- Areas open to oil and gas leasing with Controlled Surface Use (CSU) stipulations (and based on the current natural conditions of the areas managed as VRM Class I, II, and III; see Section 3.13.4):
  - *would likely be inconsistent* with the VRM Class I objective;
  - *may not be consistent* with VRM Class II and III objectives; and
  - *would be consistent* with the VRM Class IV objective.

  This is the case because oil and gas activities would still occur on all or portions of a lease. CSU stipulations are intended to be used when fluid mineral occupancy and use are generally allowed on all or portions of the lease year-round, but because of special values, or resource concerns, lease activities must be strictly controlled.

- Areas open to oil and gas leasing with No Surface Occupancy (NSO) stipulations *would be consistent* with all VRM class objectives since there would be no visually apparent surface disturbance. NSO stipulations are intended for use only when other stipulations are determined insufficient to adequately protect the public interest.
- Areas closed to oil and gas leasing *would be consistent* with all VRM class objectives because there would be no visual change to the landscape.

Impacts to visual resources are considered major if they substantially change or degrade the character of the landscape as seen from sensitive viewsheds, or if the allowable modifications exceed VRM objectives. While topography can allow for some landscape modifications, many types of disturbance, such as roads and built structures, can dominate the landscape depending on their size, distance, topographic position, presence or absence of screening, and contrast with surrounding conditions. Viewsheds deemed to be of high value are those that have high scenic quality, such as the Ventana Wilderness near U.S. Highway 101 or the Joaquin Ridge/Rocks area west of I-5, or high visual sensitivity due to a large amount of public interest and viewing.

The visual resources analysis in this Draft RMPA/EIS evaluates five oil and gas alternatives and their potential impacts on visual resources in the Planning Area. The overarching objective of BLM's Visual Resource Management is to manage public lands in a manner, which will protect the quality of their scenic (visual) values. This visual resources analysis evaluates each alternative relative to the VRM class objectives outlined in the Proposed RMPA/Final EIS (BLM, 2005) and Record of Decision for the Resource Management Plan for the Southern Diablo Mountain Range and Central Coast of California (RMP; BLM, 2007; see Table 3.13-1). Those objectives are listed in this report in Table 3.13-1 in Section 3.13.1.

Types of Impacts

Constructing oil and gas facilities would promote the types of visible landscape contrasts associated with that industry. The industrial machinery and equipment necessary for clearing vegetation, grading landforms, and drilling wells during the construction and maintenance phases of leasable oil and gas operations would result in direct, short-term contrasts of an episodic and transient nature. Movement and activity of construction and drilling machinery would draw the observer's attention to form and color contrasts. Construction equipment and activities would promote the occurrence of traffic and dust resulting in short-term landscape contrasts. The actions of well pad and road construction would result in long-term contrasts in form, line, color, and texture. Form and color contrasts would diminish somewhat as areas transition from construction to the operational phase, largely due to the absence of large equipment movement and activity.

Landscape contrast could be long-term during operational/production phases because leased areas would harbor structures and equipment that would introduce or exacerbate industrial character and create contrasts in form, texture, and possibly color. Equipment likely to appear in these areas over the long term could include tanks, compressor stations, valves, pipes, vents, and enclosed control rooms. Well pads and other areas cleared of vegetation could result in localized and moderate contrasts in line, color, and texture over the long term. Roads, pipeline corridors, and other linear areas cleared of vegetation would result in contrasts in line, color, and texture that could result in long-term land scarring.

Evaporation ponds near oil and gas well pads may draw the eye of the casual observer and could increase landscape contrasts in different ways depending on the relationship of water and vegetation surrounding the ponds. Surface disturbance would be visible when the water levels drop below a pond's capacity and vegetation does not mask contrasts in color and texture. Color contrasts could also be visible at evaporation ponds where salts and minerals accumulate on the substrate and the ponds are empty.

Production facilities could be illuminated at night resulting in nighttime color contrasts over the long term and a reduction in night-sky visibility and naturalness. The magnitude of these contrasts would depend on several factors including time of day, season, density, and extent of the oil and gas production facilities.

4.13.2 Impacts Common to All Alternatives

The Reasonably Foreseeable Development (RFD) Scenario (i.e., between zero and 37 development and exploratory wells with approximately 206 acres of surface disturbance over the next 15 to 20 years on Federal mineral estate in the Planning Area) would occur under all of the alternatives. The worst-case scenario (i.e., 37 wells and 206 acres of surface disturbance) is assumed for each alternative herein, and it is assumed that all of this disturbance would occur in one area, thereby maximizing the potential visual impacts.

For all alternatives, all oil and gas leasing in areas designated VRM Class IV would be consistent with the VRM Class IV objective (including the leases subject to the settlement agreement located in the Williams Hill area of the Salinas MA). Therefore, these leases are not addressed in the following sections.

For all alternatives, Panoche Hills WSA and San Benito WSA (both VRM Class I) would be closed to oil and gas leasing, which would be consistent with the VRM Class I objective. Furthermore, Pinnacles National Park is a non-discretionary closure that is not open to oil and gas leasing under any alternative.

For all alternatives, leases subject to the settlement agreement occur in the Williams Hill area of the Salinas MA (VRM Class IV) and the Griswold-Tumey Hills area (VRM Class III) of the San Joaquin MA.

For all alternatives, there are no leases subject to the settlement agreement located in the Central Coast and San Benito MAs.

For all alternatives, the BLM does not have any Federal mineral estate at the Coast Dairies so this area is not part of the RMPA.

4.13.3 Impacts of Alternative A (No Action)

Alternative A would utilize the 2015 RFD Scenario but would continue current visual resource management goals, objectives, and management (see Table 3.13-1) under the existing 2007 RMP (BLM, 2007). Alternative A impacts to visual resources managed by the BLM as VRM Class I, II, and III in the Planning Area are analyzed below. Alternative A would include: (1) areas open to oil and gas leasing, (2) areas open to leasing with NSO stipulations, and (3) areas closed to leasing (Figure 2-1) as addressed below by MA.

Central Coast Management Area

Ford Ord National Monument, which is designated VRM Class II, would be closed to oil and gas leasing under Alternative A (Figure 2-1); this would be *consistent* with the VRM Class II objective.

San Joaquin Management Area

The Panoche, Griswold, Tumey, and Ciervo Hills and Coalinga Mineral Springs areas of the San Joaquin MA are designated VRM Class III. Under Alternative A, these areas would contain: (1) areas open to oil and gas leasing with no stipulations and (2) areas open to leasing with NSO stipulations (Figure 2-1). Oil and gas leasing with no stipulations has the potential to cause a high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). Leases with NSO stipulations would result in no visually apparent surface disturbance, which would be *consistent* with the VRM Class III objective.

The Joaquin Rocks area is designated VRM Class II. Under Alternative A, this area would contain: (1) areas open to oil and gas leasing with no stipulations and (2) areas open to leasing with NSO stipulations (Figure 2-1). Oil and gas leasing with no stipulations has potential to create moderate to high levels of

visual change and result in adverse visual impacts that would *likely be inconsistent* with the VRM Class II objective (only a low level of change allowed). Leases with NSO stipulations would result in no visually apparent surface disturbance, which would be *consistent* with the VRM Class II objective.

Salinas Management Area

The Sierra de Salinas area of the Salinas MA is designated VRM Class III. Under Alternative A, this area would contain areas open to oil and gas leasing with no stipulations (Figure 2-1). These leases have potential to create a high level of visual change and result in adverse visual impacts. Therefore, they *may be inconsistent* with the VRM Class III objective (moderate level of change allowed).

Also under Alternative A, the Ventana (and Silver Peak) Wilderness Area and the Bear Mountain WSA would be closed to oil and gas leasing under Alternative A (Figure 2-1); this would be *consistent* with the VRM Class I objective.

San Benito Management Area

The Hernandez Valley, Call Mountain, and Laguna Mountain areas of the San Benito MA are designated VRM Class III. Under Alternative A, these areas would contain areas open to oil and gas leasing with no stipulations (Figure 2-1), which has the potential create a high level of visual change and, therefore, result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed).

Mitigation

Mitigation Measures VR-1 through VR-10 include the types of measures that could be implemented to lessen the degree of potential adverse visual impacts from oil and gas leases associated with Alternative A. These measures incorporate the fundamental principles in the VRM system upon which the VRM BMPs are based and include proper site selection, minimizing visual contrast, reducing unnecessary surface disturbance, exercising proper color selection, and restoration of impacted landscapes.

VR-1 **Construction Activities.** Locate construction sites and all staging and material and equipment storage areas, including storage sites for excavated materials, away from areas of high public visibility. If visible from nearby roads, residences, public gathering areas, or recreational areas, facilities, or trails, construction sites, and staging and storage areas should be visually screened with fencing of an appropriate design and color for each specific location.

VR-2 **Vegetation Removal.** Remove only the minimum amount of vegetation necessary for construction. Conserve topsoil located in areas containing sensitive habitat, to the extent such areas are not already avoided, and reuse it as cover on disturbed areas to facilitate re-growth of vegetation.

Limit Disturbance Areas. Delineate the boundaries of all areas to be disturbed with stakes and flagging (no marking of natural features) before construction and in consultation with a visual resources specialist. Locate parking areas and staging and disposal sites in areas approved by the visual resources specialist. Confine all disturbances by vehicles and equipment to the delineated areas.

Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements should not extend beyond the delineated limits as described above. All vehicles passing or turning around should do so within the delineated limits or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route should be clearly marked (e.g., staked and flagged) before the start of construction and in consultation with a visual resources specialist.

VR-3 **Revegetate Temporarily Disturbed Areas.** Revegetate all areas subject to temporary disturbance to pre-disturbance grade and conditions. The goal of revegetation is to minimize visual impacts by re-establishing the pre-existing colors, textures, and forms of the landscape. Visually integrate adjacent edges by removing lines of demarcation.

VR-4 **Color Contrast of Land Scars.** Where construction would unavoidably create land scars visible from sensitive public viewing locations, treat disturbed soils with an appropriate material (Natina Concentrate, Eonite, Permeon, or similar) to reduce the visual contrast created by lighter-colored disturbed soils and rock with darker soil and vegetated surroundings.

VR-5 **In-line Views of Land Scars.** Land scars could result from construction of access roads, for example, and those roads should be constructed at appropriate angles from the originating, primary travel facilities to minimize extended, in-line views of newly graded terrain. All new access roads should be evaluated for their visibility from sensitive viewing locations prior to final design. "Drive and crush" access is a feasible measure to avoid access road scars where grading or vegetation removal are not required.

VR-6 **Construction Marking of Natural Features.** Do not apply paint or permanent discoloring agents to rocks or vegetation to indicate survey or construction activity limits or for any other purpose.

VR-7 **Waste Control.** Place all trash and food-related waste in self-closing containers to be removed weekly or as needed.

VR-8 **Night Lighting.** Avoid night lighting where possible and minimize it under all circumstances. Consistent with safety and security considerations, install lighting such that: (a) lamps and reflectors are not visible from beyond the construction site or facility; (b) lighting does not cause excessive reflected glare; (c) direct lighting does not illuminate the nighttime sky; and (d) permanent light sources that are used are below 3,500 Kelvin color temperature (warm white) and are full cutoff fixtures.

Limit always-on security lighting to one low-wattage, fully shielded, full cutoff light fixture at main entrances to facilities. Include security lighting that is motion-activated (and only through the use of passive infrared sensors) and controlled as specific zones such that only targeted areas are illuminated. Do not utilize other lighting on a nightly basis when a facility is not occupied.

VR-9 **Project Design.** Use proper design fundamentals to reduce the visual contrast to the characteristic landscape through: proper siting and location; reduction of visibility; repetition of form, line, color, and texture of the landscape; and reduction of unnecessary disturbance. Design strategies that can address these fundamentals may be based on the following factors.

- **Earthwork.** Select locations and alignments that fit into the landforms to minimize the sizes of cuts and fills.
- **Vegetation Manipulation.** Use existing vegetation to screen graded areas and facilities from public viewing to the extent feasible. Feather and thin the edges of cleared areas and retain a representative mix of plant species and sizes.
- **Facilities.** Minimize the number of facilities. Use natural, self-weathering materials and/or chemical treatments on surfaces to reduce color contrast (see Mitigation Measure VR-10). Use road aggregate and concrete colors that match the color of the characteristic landscape surface or apply appropriate colorants such as Natina Concentrate.
- **Reclamation and Restoration.** Blend disturbed areas into the characteristic landscape. Replace soil, brush, rocks, and natural debris over these disturbed areas. Newly introduced plant species should be of a form, color, and texture that blend with the landscape.

VR-10 **Surface Treatment.** Treat the surfaces of all facilities visible to the public such that their colors minimize visual contrast by blending with the characteristic landscape, and their colors and finishes do not create excessive glare.

AQ-1 **Control or Suppress Fugitive Dust.**

Leases Subject to Settlement Agreement – Subalternative 1

Some of the leases subject to the settlement agreement are located in areas open to oil and gas leasing with no stipulations in the Griswold-Tumey Hills area of the San Joaquin MA that is designated VRM Class III (Figure 2-1). Under Alternative A, this oil and gas leasing has the potential to create a high level of change and result in adverse visual impacts. Therefore, it *may be inconsistent* with the VRM Class III objective.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.13.4 Impacts of Alternative B

Alternative B impacts to visual resources managed by the BLM as VRM Class I, II, and III in the Planning Area are analyzed below. Alternative B only includes: (1) areas that would be open to oil and gas leasing with CSU stipulations and (2) areas that would be closed to leasing (Figure 2-2).

Central Coast Management Area

The Fort Ord National Monument is closed to oil and gas leasing under Alternative B (Figure 2-2); this would be *consistent* with the VRM Class I objective.

San Joaquin Management Area

The Panoche Hills, Ciervo Hills, and Coalinga Mineral Springs areas of the San Joaquin MA would be closed to oil and gas leasing (Figure 2-2), which would be *consistent* with the VRM Class III objective (moderate level of change allowed) for these areas. The Griswold-Tumey Hills area (also VRM Class III) would contain areas both closed to oil and gas leasing and open to leasing with CSU stipulations (Figure 2-2). Areas closed to leasing would be *consistent* with the VRM Class III objective. Even with CSU stipulations, oil and gas leasing has the potential to cause a high level of visual change and result in adverse visual impacts. Therefore, it *may be inconsistent* with the VRM Class III objective.

The Joaquin Rocks area is designated VRM Class II. Under Alternative B, a portion of this area would be open to oil and gas leasing with CSU stipulations (Figure 2-2). Even with CSU stipulations, however, the leases have potential to create a moderate to high level of change and result in adverse visual impacts that may be inconsistent with the VRM Class II objective (low level of change allowed).

Salinas Management Area

The Sierra de Salinas area of the Salinas MA is designated VRM Class III. Under Alternative B, this area would be closed to oil and gas leasing (Figure 2-2), which would be *consistent* with the VRM Class III objective (moderate level of change allowed). Additionally, the Ventana (and Silver Peak) Wilderness Area and Bear Mountain and Bear Canyon WSAs (VRM Class I) would be closed to leasing, which would be *consistent* with VRM Class I objective (only a very low level of change allowed).

San Benito Management Area

The Hernandez Valley, Call Mountain, and Laguna Mountain areas of the San Benito MA are designated VRM Class III (moderate level of change allowed). Under Alternative B, these areas would be closed to oil and gas leasing (Figure 2-2), which would be *consistent* with the Class III objective.

Mitigation

Mitigation Measures VR-1 through VR-10 and AQ-1 at the end of Section 4.13.3 include the types of measures that could be implemented to lessen the degree of potential adverse visual impacts from oil and gas leases associated with Alternative B.

Leases Subject to Settlement Agreement

Some of the leases subject to settlement agreement are located in areas that would be open to oil and gas leasing with CSU stipulations in the Griswold-Tumey Hills area of the San Joaquin MA that is designated VRM Class III (Figure 2-2). Even with CSU stipulations, oil and gas leasing has potential to create a high level of visual change and, therefore, result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective. Other areas located in the Griswold-Tumey Hills would be closed to oil and gas leasing (Figure 2-2), which would be *consistent* with the VRM Class III objective.

4.13.5 Impacts of Alternative C

Alternative C impacts to visual resources managed by the BLM as VRM Class I, II, and III in the Planning Area are analyzed below. Alternative C would include: (1) areas that would be open to oil and gas leasing with CSU stipulations, (2) areas that would be open to leasing with NSO stipulations, and (3) areas that would be closed to leasing (Figure 2-3).

Central Coast Management Area

The Fort Ord National Monument is closed to oil and gas leasing under Alternative C (Figure 2-3); this would be *consistent* with the VRM Class I objective.

San Joaquin Management Area

Under Alternative C, the Panoche Hills, Griswold, Tumey, and Ciervo Hills and Coalinga Mineral Springs areas (VRM Class III) of the San Joaquin MA would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-3). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). The Panoche Hills area would also contain areas open to oil and gas leasing with NSO stipulations; Figure 2-3). The leases with NSO stipulations would result in no visually apparent surface disturbance and would, therefore, be consistent with the VRM Class III objective.

The Joaquin Rocks area is designated VRM Class II. Under Alternative C, this area would also be open to oil and gas leasing with CSU stipulations (Figure 2-3). Even with CSU stipulations, however, the leases have potential to create a moderate to high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class II objective (low level of change allowed).

Salinas Management Area

The Sierra de Salinas area of the Salinas MA is designated VRM Class III. The Ventana (and Silver Peak) Wilderness Area would typically be afforded visual resource protections comparable to the BLM's VRM Class I objective (only a very low level of change allowed). Bear Mountain and Bear Canyon WSAs are designated VRM Class I. Under Alternative C all of these areas would be closed to oil and gas leasing (Figure 2-3), which would be *consistent* with: (1) the VRM Class III objective (moderate level of change allowed), (2) protections comparable to the VRM Class I objective, and (3) the VRM Class I objective.

San Benito Management Area

Under Alternative C, the Hernandez Valley and Call Mountain areas (VRM Class III) of the San Benito MA would contain: (1) areas open to oil and gas leasing with CSU stipulations and (2) areas open to leasing with NSO stipulations (Figure 2-3). Even with CSU stipulations, the leases have potential to create a high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). The leases with NSO stipulations would result in no visually apparent surface disturbance and would, therefore, be consistent with the VRM Class III objective.

The Laguna Mountain area (Class III) would contain: (1) areas closed to leasing and (2) areas open to leasing with NSO stipulations (Figure 2-3). The closure of areas to leasing would be *consistent* with the VRM Class III objective. The leases with NSO stipulations would result in no visually apparent surface disturbance and would also be consistent with the VRM Class III objective.

Mitigation

Mitigation Measures VR-1 through VR-10 and AQ-1 at the end of Section 4.13.3 include the types of measures that could be implemented to lessen the degree of potential adverse visual impacts from oil and gas leases associated with Alternative C.

Leases Subject to Settlement Agreement

Some of the leases subject to settlement agreement are located in areas that would be open to oil and gas leasing with CSU stipulations in the Griswold-Tumey Hills area of the San Joaquin MA (Figure 2-3) designated VRM Class III. Even with CSU stipulations, the leases have potential to create a high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective.

4.13.6 Impacts of Alternative D

Alternative D impacts to visual resources managed by the BLM as VRM Class I, II, and III in the Planning Area are analyzed below. Alternative D includes: (1) areas that would be open to oil and gas leasing with CSU stipulations, (2) areas that would be open to leasing with NSO stipulations, and (3) areas that would be closed to leasing (Figure 2-4).

Central Coast Management Area

The Fort Ord National Monument is closed to oil and gas leasing under Alternative D (Figure 2-4); this would be *consistent* with the VRM Class I objective.

San Joaquin Management Area

Under Alternative D, the Panoche Hills, Griswold, Tumey, and Ciervo Hills, and Coalinga Mineral Springs areas (VRM Class III) of the San Joaquin MA would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-4). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed).

These same areas would also contain areas open to oil and gas leasing with NSO stipulations (i.e., Panoche, Griswold, Tumey, and Ciervo Hills) and areas closed to leasing (i.e., Griswold-Tumey Hills and Coalinga Mineral Springs; Figure 2-4). The leases with NSO stipulations and areas closed to leasing would result in no visually apparent surface disturbance and no surface disturbance, respectively, and would, therefore, be *consistent* with the VRM Class III objective.

The Joaquin Rocks area is designated VRM Class II. Under Alternative D, this area would be open to oil and gas leasing with CSU stipulations (Figure 2-4). Even with CSU stipulations, the leases have potential to create a moderate or high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class II objective (low level of change allowed). Other areas in the Joaquin Rocks area would be open to oil and gas leasing with NSO stipulations (Figure 2-4), so there would be no visually apparent surface disturbance. The leases with NSO stipulations would be *consistent* with the VRM Class II objective.

Salinas Management Area

The Sierra de Salinas area of the Salinas MA is designated VRM Class III. Under Alternative D, this area would contain: (1) areas open to oil and gas leasing with CSU stipulations and (2) areas closed to leasing (Figure 2-4). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). The areas closed to leasing, however, would be *consistent* with that objective.

The Ventana (and Silver Peak) Wilderness Area would be closed to oil and gas leasing under Alternative D (Figure 2-4), which would be *consistent* with visual resource protections comparable to the VRM Class I objective (only a very low level of change allowed) that would be afforded by the managing agencies. The Bear Mountain and Bear Canyon WSAs would also be closed to oil and gas leasing (Figure 2-4), which would be *consistent* with the VRM Class I objective.

San Benito Management Area

Under Alternative D, the Hernandez Valley, Call Mountain, and Laguna Mountain areas (VRM Class III) of the San Benito MA would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-4). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). Under Alternative D, these areas would also contain areas closed to leasing (Figure 2-4), which would be *consistent* with the VRM Class III objective.

Mitigation

Mitigation Measures VR-1 through VR-10 and AQ-1 at the end of Section 4.13.3 include the types of measures that could be implemented to lessen the degree of potential adverse visual impacts from oil and gas leases associated with Alternative D.

Leases Subject to Settlement Agreement

Some of the leases subject to settlement agreement are located in areas that would be open to oil and gas leasing with CSU stipulations in the Griswold-Tumey Hills area of the San Joaquin MA (Figure 2-4) that is designated VRM Class III. Even with CSU stipulations, the leases have potential to create a high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective.

4.13.7 Impacts of Alternative E

Alternative E impacts to visual resources managed by the BLM as VRM Class I, II, and III in the Planning Area are analyzed below. Alternative E includes: (1) areas that would be open to oil and gas leasing with CSU stipulations, (2) areas that would be open to leasing with NSO stipulations, and (3) areas that would be closed to leasing (Figure 2-5).

Central Coast Management Area

The Fort Ord National Monument is closed to oil and gas leasing under Alternative E (Figure 2-5); this would be *consistent* with the VRM Class I objective.

San Joaquin Management Area

Under Alternative E, the Panoche, Griswold, Tumey, and Ciervo Hills and Coalinga Mineral Springs areas (VRM Class III) of the San Joaquin MA would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-5). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed).

Panoche Hills and Griswold-Tumey Hills (VRM Class III) would also contain areas open to oil and gas leasing with NSO stipulations and both would contain areas closed to leasing (Figure 2-5). The leases with NSO stipulations and areas closed to leasing would result in no visually apparent surface disturbance and no surface disturbance, respectively, and would, therefore, be *consistent* with the VRM Class III objective.

The Joaquin Rocks area is designated VRM Class II. Under Alternative E, this area would be open to oil and gas leasing with CSU stipulations (Figure 2-5). Even with CSU stipulations, the leases have potential to create a moderate to high level of visual change and result in adverse visual impacts that *may be inconsistent* with the VRM Class II objective (low level of change allowed). Other areas in the Joaquin Rocks area would be open to oil and gas leasing with NSO stipulations (Figure 2-5), so there would be no visually apparent surface disturbance. The leases with NSO stipulations would be *consistent* with the VRM Class II objective.

Salinas Management Area

The Sierra de Salinas area of the Salinas MA is designated VRM Class III. Under Alternative E, this area would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-5). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). The Sierra de Salinas area would also contain areas open to leasing with NSO stipulations (Figure 2-5). The leases with NSO stipulations would be *consistent* with the VRM Class III objective since there would be no visually apparent surface disturbance.

The Ventana (and Silver Peak) Wilderness Area and Bear Mountain and Bear Canyon WSAs (VRM Class I) would be closed to oil and gas leasing (Figure 2-5); this would be consistent with VRM Class I objective.

San Benito Management Area

Under Alternative E, the Hernandez Valley, Call Mountain, and Laguna Mountain areas (VRM Class III) of the San Benito MA would contain areas open to oil and gas leasing with CSU stipulations (Figure 2-5). Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective (moderate level of change allowed). The Laguna Mountain area would also contain areas open to leasing with NSO stipulations (Figure 2-5). Since there would be no visually apparent surface disturbance, those leases would be *consistent* with the VRM Class III objective.

Mitigation

Mitigation Measures VR-1 through VR-10 and AQ-1 at the end of Section 4.13.3 include the types of measures that could be implemented to lessen the degree of potential adverse visual impacts from oil and gas leases associated with Alternative E.

Leases Subject to Settlement Agreement

Some of the leases subject to settlement agreement are located in areas that would be open to oil and gas leasing with CSU stipulations in the Griswold-Tumey Hills area of the San Joaquin MA (Figure 2-5) that is designated VRM Class III. Even with CSU stipulations, the leases have potential to create a high level of change and result in adverse visual impacts that *may be inconsistent* with the VRM Class III objective. Some of the leases are also located in areas that would be open to oil and gas leasing with NSO stipulations (Figure 2-5), which would be *consistent* with the VRM Class III objective since there would be no visually apparent surface disturbance.

4.14 Special Management Areas

This section provides the impact analysis for the potential effects to national monuments, national recreation and historic trails, Areas of Critical Environmental Concern (ACECs), Research Natural Areas (RNAs), Wilderness Areas, and Wilderness Study Areas (WSAs), by alternative. These SMAs are described in Section 3.14 and are shown in Figure 3.14-1. Effects on Wild and Scenic Rivers are discussed in Section 3.21.

4.14.1 Introduction

Approach to Impact Assessment

This analysis identifies effects of management decisions on the BLM's ability to prevent irreparable damage to the relevant and important values associated with each SMA. In concert with the BLM guidelines, the impact analysis considers management actions that "defend or guard against damage or loss" to the relevant and important values. This includes effects to values that could be restored and those that would be irreparable during the 20-year planning period. The management actions associated with the alternatives could either degrade or retain the relevant and important values.

Assumptions

The analysis is based on the following assumptions:

- The BLM would continue to manage each ACEC according to the prescriptions included in the 2007 HFO RMP.
- Under all alternatives, WSAs will continue to be managed according to BLM Manual 6330 (Management of BLM Wilderness Study Areas) until such time that Congress designates them as Wilderness Areas or releases them from consideration.
- Under the 2007 HFO RMP, prior existing rights within Wilderness Areas and WSAs are permitted to continue. As the proposed RMPA alternatives would not alter the management of Wilderness Areas and WSAs, the effects of valid existing rights are not included in the analysis.
- Future environmental analyses would be conducted, as appropriate, for project- and site-specific actions proposed in the CCFO Planning Area. Applications for Permit to Drill would address potential conflicts between oil and gas development and other resources within the site specific area.
- As described in Section 2.5.2, the same level of oil and gas development under the 2015 RFD Scenario would apply to each alternative (i.e., 37 exploratory and development wells on 206 acres of disturbance).
- All surface-disturbing activities related to the 2015 RFD Scenario would most likely occur on Federal mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO Planning Area but may potentially occur anywhere that is open to oil and gas leasing. New oil and gas well locations would most likely be within or near established producing oil and gas fields.

4.14.2 Impacts Common to All Alternatives

As discussed in Section 3.14, SMAs are managed by the BLM in order to protect their ecological, historic, cultural, scenic, scientific, and recreation resources and values. While specific SMAs such as the Panoche/Coalinga ACEC have been open to oil and gas leasing under the 2007 HFO RMP, SMA designations generally limit available areas for energy development and require stipulations for oil and gas leases.

The following SMAs were closed to oil and gas leasing under the 2007 HFO RMP, and would continue to be closed under all alternatives:

- Wilderness Areas
- Wilderness Study Areas
- Fort Ord National Monument
- Clear Creek Serpentine ACEC

The severity of impacts from oil and gas development on SMAs is dependent upon the degree to which oil and gas activities would affect the specific resources for which an SMA is designated. Impacts may vary in intensity and duration depending on the location and duration of oil and gas development within an SMA and the type of resource values that are protected. As described in the 2015 RFD Scenario, it is unlikely that more than 37 exploratory and development wells would be drilled on Federal oil and gas leases, and total estimated ground disturbance would not be expected to exceed 206 acres.

Although specific SMAs would be closed to oil and gas leasing under each alternative, oil and gas development outside of SMAs could indirectly affect these special designations. For example, noise associated with oil and gas development (e.g., truck traffic, drilling, well pumps, compressors, etc.) as well as a severe degradation of air quality[1] could alter the habitat conditions for biological resources that are protected within an SMA, which would create a moderate impact on these resources. A major impact to an SMA could result from surface disturbance and the presence of industrial infrastructure that would permanently alter the visual character of land surrounding the SMA. However, the degree of impact would depend on the final location of the estimated 206 acres of disturbance. Over the long-term, oil and gas development may create permanent impacts to an SMA's resource values such that the eligibility of the SMA (i.e., purpose for its special designation) would change. An SMA that was to lose its eligibility for a special designation would have suffered major impacts to its resource values.

During the BLM's Social and Economic Workshop held on February 4, 2015, a primary concern expressed by participants was the adequacy of protection measures to minimize the impacts to local resources from oil and gas development (see Appendix F). Sections 4.14.3 through 4.14.7 discuss the effectiveness of proposed stipulations as well as the need for additional mitigation to protect SMAs.

Leases Subject to Settlement Agreement

None of the 14 non-NSO leases would be located within 2 miles of an SMA. Given the distance of these leases from SMAs, which is the same for each of the RMPA alternatives, future oil and gas development within the 14 lease areas would create a negligible impact on special designations. Therefore, the leases subject to settlement agreement are not discussed further.

4.14.3 Impacts of Alternative A (No Action)

Section 4.14.2 lists the SMAs that would be closed to oil and gas development under all alternatives. The following SMAs would be open to oil and gas leasing under Alternative A:

- Juan Bautista de Anza National Historic Trail
- Coalinga Mineral Springs National Recreation Trail
- Panoche/Coalinga ACEC (subject to NSO stipulations)
- Joaquin Rocks ACEC (subject to NSO stipulations)

As identified above, NSO stipulations would apply to the ACECs and the RNA open to leasing under Alternative A. The text of this NSO stipulation is included below and described in detail in Appendix C (Statewide Stipulations):

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[1] Air emission sources during oil and gas development include construction equipment, combustion emissions, fugitive natural gas, and fugitive dust. See Section 4.5 (Air Quality and Atmospheric Conditions) and Section 4.6 (Greenhouse Gas Emissions/Climate Change) for a full discussion of air emission impacts.

The NSO-General stipulation would be applied when adequate protection of surface resources cannot be provided through mitigation, and fluid mineral development of the lease from an off-site location is recommended. If there is no surface location available for directional drilling, the land would not be leased.

With application of this NSO stipulation, oil and gas leases would not be granted in the event that a surface location is not available for directional drilling, which would effectively protect important SMA resource values. Impacts to the ACECs and RNA that would be open to leasing under Alternative A would occur over the long-term (i.e., during oil and gas drilling and production), but would be minor given that SMAs would be managed with NSO stipulations. As discussed in Sections 4.14.4 through 4.14.7, the degree of impact from Alternative A would be less than Alternatives C and E due to the larger acreage where Alternative A would apply NSO stipulations to SMAs. However, overall impacts to SMAs from Alternative A would be greater than Alternatives B and D given that a larger acreage of Federal mineral estate within SMAs would be open to leasing under Alternative A than Alternatives B and D.

Special designations not subject to NSO stipulations under Alternative A include the national historic and national recreation trails listed above. Without stipulations or other conditions of approval, if oil and gas development occurred along these trails it could degrade cultural or historic resources (i.e., Juan Bautista de Anza National Historic Trail), or conflict with designated recreation uses (i.e., hunting at Coalinga Mineral Springs National Recreation Trail) leading to effects that range from minor impacts over the short-term (e.g., temporary trail closure or reroute, construction noise and fugitive dust) to major impacts over the long-term (e.g., area no longer suitable for recreational use).

4.14.4 Impacts of Alternative B

Section 4.14.2 lists the SMAs that would be closed to oil and gas development under all alternatives. The following SMAs would be open to oil and gas leasing under Alternative B:

- Panoche/Coalinga ACEC (the majority of the ACEC would be closed to leasing)
- Joaquin Rocks ACEC (the majority of the ACEC would be closed to leasing)

The NSO stipulation discussed in Section 4.14.3 would not apply to the SMAs open for oil and gas leasing under Alternative B. Without stipulations or other conditions of approval, if oil and gas development occurred within SMAs it could degrade biological resources (i.e., Panoche/Coalinga ACEC), visual resources (i.e., Joaquin Rocks ACEC), or conflict with designated recreation uses. This could lead to effects ranging from minor impacts over the short-term (e.g., temporary closure to public access, construction noise and fugitive dust) to major impacts over the long-term (e.g., area no longer eligible for special designation). Unlike Alternative A, Alternative B would apply CSU stipulations to all Federal mineral estate open to leasing, which are used to alter the site-specific location of well pads, pipelines, and roads to avoid important resources. CSU stipulations would effectively minimize indirect impacts to SMAs. Given that Alternative B would have the fewest acres of open areas on SMAs and CSU stipulations would apply to all open lease areas, Alternative B would create the least adverse effects on SMAs compared with all other alternatives. Mitigation measures to minimize impacts to SMAs are identified below.

Mitigation

SMA-1 **Apply Lease Stipulations within ACECs and RNAs.** Prior to granting an oil and gas lease within the boundary of an Area of Critical Environmental Concern or a Research Natural Area, the BLM shall determine whether lease stipulations are needed to reduce or avoid impacts to the special designation's resource values. If lease stipulations are recommended, one of the following measures shall be applied to the lease: No Surface Occupancy, Controlled Surface Use, or Timing Limitation. Lease stipulations shall comply with the guidelines that are fully described in Appendix C (Central Coast Oil and Gas Stipulations).

4.14.5 Impacts of Alternative C

Section 4.14.2 lists the SMAs that would be closed to oil and gas development under all alternatives. The following SMAs would be open to oil and gas leasing under Alternative C:

- Coalinga Mineral Springs National Recreation Trail
- Panoche/Coalinga ACEC (some areas within the ACEC would be closed to leasing)
- Joaquin Rocks ACEC

The NSO stipulation discussed in Section 4.14.3 would not apply to the SMAs open for oil and gas leasing under Alternative C. Without stipulations or other conditions of approval, if oil and gas development occurred within SMAs it could degrade biological resources (i.e., Panoche/Coalinga ACEC), visual resources (i.e., Joaquin Rocks ACEC), or conflict with designated recreation uses (i.e., hunting at Coalinga Mineral Springs National Recreation Trail). This could lead to effects ranging from minor impacts over the short-term (e.g., temporary closure to public access, construction noise and fugitive dust) to major impacts over the long-term (e.g., area no longer eligible for special designation). The degree of impact from Alternative C could be the greatest among all of the alternatives given that Alternative C would have the greatest acreage of SMAs open to oil and gas leasing, and none of this acreage would be subject to NSO stipulations. Mitigation measures to minimize impacts to SMAs are identified below.

Mitigation

The following mitigation measures would apply to the avoidance or reduction of impacts to SMAs. The effectiveness of these measures and the potential for residual impact following their implementation would depend on the exact location of future oil and gas lease sites relative to each SMA, as well as project-specific conditions:

SMA-1 **Apply Lease Stipulations within ACECs and RNAs.** See full text of this measure under Section 4.14.5, Impacts of Alternative B.

SMA-2 **Apply CSU-Existing Surface Use/Management Stipulation along National Trails.** Prior to granting an oil and gas lease within 1,000 feet of a national historic trail or national recreation trail, the BLM shall determine whether a Controlled Surface Use (CSU)-Existing Surface Use/Management stipulation shall be applied to that lease. If the BLM determines that a CSU stipulation shall be applied to all, or part, of a lease, it shall comply with the guidelines that are fully described in Appendix C (Central Coast Oil and Gas Stipulations).

4.14.6 Impacts of Alternative D

Section 4.14.2 lists the SMAs that would be closed to oil and gas development under all alternatives. The following SMAs would be open to oil and gas leasing under Alternative D:

- Coalinga Mineral Springs National Recreation Trail (some areas around the trail would be closed to leasing)
- Panoche/Coalinga ACEC (mostly open and subject to NSO stipulations including for the Monvero Dunes RNA; some areas within the ACEC would be closed to leasing)
- Joaquin Rocks ACEC (subject to NSO stipulations)

As identified above, NSO stipulations would apply to the ACECs and the RNA open to leasing under Alternative D. The text of this NSO stipulation is presented under Alternative A. With application of this NSO stipulation, oil and gas leases would not be granted in the event that a surface location is not available for directional drilling, which would effectively protect important SMA resource values. Impacts to the ACECs and RNA that would be open to leasing under Alternative D could occur over the long-term (i.e., during oil and gas drilling and production), but would be minor given that SMAs would be managed with NSO stipulations. The degree of impact from Alternative D could be less than Alternatives A, C, and E given that Alternative D would have less acreage available for oil and gas leasing within and around

SMAs. However, the complete closure of SMAs to oil and gas leasing under Alternative B would create less of an impact (i.e., negligible impact) on SMAs than under Alternative D (i.e., minor impact).

A special designation that would not be subject to NSO stipulations under Alternative D is the Coalinga Mineral Springs National Recreation Trail. Without stipulations or other conditions of approval, if oil and gas development occurred along this trail it could conflict with designated recreation uses (i.e., hunting). This would lead to effects that range from minor impacts over the short-term (e.g., temporary trail closure or reroute, construction noise and fugitive dust) to major impacts over the long-term (e.g., area no longer suitable for recreational use). Mitigation measures to minimize impacts to this national recreation trail are identified below.

Mitigation

The following mitigation measure would apply to the avoidance or reduction of impacts to the Coalinga Mineral Springs National Recreation Trail, depending on future oil and gas lease sites and project-specific conditions:

SMA-2 **Apply CSU-Existing Surface Use/Management Stipulation along National Trails.** See full text of this measure under Section 4.14.5, Impacts of Alternative C.

4.14.7 Impacts of Alternative E

Section 4.14.2 lists the SMAs that would be closed to oil and gas development under all alternatives. The following SMAs would be open to oil and gas leasing under Alternative E:

- Juan Bautista de Anza National Historic Trail (subject to NSO stipulations along some areas of the trail)
- Coalinga Mineral Springs National Recreation Trail
- Panoche/Coalinga ACEC (mostly open; subject to NSO stipulations within a small area of the ACEC)
- Joaquin Rocks ACEC

The NSO stipulation discussed in Section 4.14.3 would not apply to many of the SMAs open for oil and gas leasing under Alternative E. Without stipulations or other conditions of approval, if oil and gas development occurred within SMAs it could degrade biological resources (i.e., Panoche/Coalinga ACEC), visual resources (i.e., Joaquin Rocks ACEC), degrade cultural or historic resources (i.e., Juan Bautista de Anza National Historic Trail), or conflict with designated recreation uses (i.e., hunting at Coalinga Mineral Springs National Recreation Trail). This would lead to effects that range from minor impacts over the short-term (e.g., temporary closure to public access, construction noise and fugitive dust) to major impacts over the long-term (e.g., area no longer eligible for special designation). The degree of impact from Alternative E would be less than Alternative C given that Alternative E would have less acreage of SMAs open to oil and gas leasing and would require NSO stipulations in some lease areas. Overall impacts to SMAs from Alternative E would be greater than Alternatives A, B, and D as Alternative E would have more acreage of SMAs open to oil and gas leasing with less acreage subject to NSO stipulations compared with the other three alternatives. Mitigation measures to minimize impacts to SMAs are identified below.

Mitigation

The following mitigation measures would apply to the avoidance or reduction of impacts to SMAs. The effectiveness of these measures and the potential for residual impact following their implementation would depend on the exact location of future oil and gas lease sites relative to each SMA, as well as project-specific conditions.

SMA-1 **Apply Lease Stipulations within ACECs and RNAs.** See full text of this measure under Section 4.14.5, Impacts of Alternative B.

SMA-2 **Apply CSU-Existing Surface Use/Management Stipulation along National Trails.** See full text of this measure under Section 4.14.5, Impacts of Alternative C.

4.15 Cultural and Heritage Resources

The goals for cultural resource management in the CCFO Planning Area as identified in the 2007 Proposed Resource Management Plan (RMP) are to (1) identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations; (2) provide access to areas managed by the CCFO for federally and non-federally recognized Native Americans and California Indians for the purpose of maintaining traditional values intrinsic to their cultural identities; (3) fulfill the essential roles that public communication and heritage education play in historic preservation; and (4) improve access where appropriate to cultural resources on public lands for the benefit of public use. With these goals in mind, potential consequences of the oil and gas development actions identified in the Reasonably Foreseeable Development (RFD) Scenario are assessed.

4.15.1 Introduction

Cultural resources include prehistoric and historic archaeological sites, artifacts and rock art, sacred sites and other traditional cultural properties, buildings and structures, landscaping, historic districts, and rural landscapes. Consideration and treatment of cultural resources by Federal agencies is mandated by a number of Federal statutes (see Section 3.15.2). Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to "take into account the effects of Federal actions on historic properties" and outlines Federal agency responsibilities for identification, management, protection, preservation, and use of historic properties. The principal Federal regulations that guide implementation of the NHPA are found at 36 CFR 800 (Protection of Historic Properties) and 36 CFR 60 (National Register of Historic Places [NRHP]). The Bureau of Land Management (BLM) National Programmatic Agreement (PA) between BLM, the Advisory Council on Historic Preservation (ACHP), and the National Conference of State Historic Preservation Officers (NCSHPO) provides alternative procedures for implementing 36 CFR 800, along with BLM Manual Series 8100 and the California Protocol implementing the 2012 National PA.

Assumptions

Cultural sites can potentially occur anywhere in the Decision Area, which has not been completely inventoried for the presence of cultural sites. Some yet to be identified cultural resources may be determined significant and qualify for consideration under the NHPA. Such resources as identified pursuant to the NHPA are designated as "historic properties" and are defined in 36 CFR 800.16(1) as "any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP)." Archaeological components of historic properties on Federal lands are identified through survey, research, and often test excavations to determine their NRHP eligibility. Culturally sensitive locations may be identified through government-to-government consultation with federally recognized tribes and outreach to other Native American individuals and groups. Not all sites or places of cultural value may qualify as historic properties under the NHPA, but may be considered part of the environment for purposes of NEPA review and addressed under such authorities as AIRFA and Executive Order 13007, Sacred Sites.

Given the above considerations, the analysis of historic properties is based on the following assumptions:

- Archaeological sites are highly sensitive to impacts, which are irreversible, and result in irretrievable loss.
- Archaeological resources derive their data value from the context of the artifacts and physical features contained within the site. Therefore, disturbance of the arrangement of the site contents effectively destroys the information it contains.

- Unless determined otherwise, all cultural resources including archeological sites are treated as eligible historic properties and afforded the associated emphasis on preservation through avoidance of any potential adverse effect.
- Sensitive cultural resource records, site location information, and traditional cultural properties and values must be held confidential from the public as deemed appropriate to protect historic properties (NHPA, Section 304 [a], Archaeological Resource Protection Act [ARPA], Section 9[a]).
- Historic properties could continue to be found throughout the CCFO Planning Area, given the long history of occupation and the non-random distribution of critical resources (food, water, shelter, and raw materials for tools).
- Commonly in the region, historic properties are more likely to be found on shallow slopes and close to reliable water sources.
- Historic properties in the CCFO Planning Area have been buried, destroyed, or altered by natural agents (erosion and deposition) and human activity. Such disturbance from natural and human agents is likely to continue.
- Oil and gas exploration or development activities have the potential to cause irreversible disturbance and damage to non-renewable historic properties. The BLM could mitigate impacts to these resources from authorized uses through project avoidance, redesign, and, if necessary, data recovery investigations, in accordance with the BLM Manual 8100 and with the protocols set forth in the BLM's National Cultural Programmatic Agreement (2012) and the corresponding 2014 statewide agreement with the California State Historic Preservation Office.
- Operators must submit proposals for any site-specific project that would require the BLM approval. Additional site-specific NEPA analyses and a Section 106 review will be conducted on these individual projects. The BLM will complete comprehensive identification (e.g., field inventory), evaluation, protection, and mitigation following the pertinent laws, regulations, and policies.
- The BLM does not approve any ground-disturbing activities that may adversely affect any historic properties, sacred landscapes, and/or resources protected under the NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.
- Upon request by Native Americans access to places of importance to Native American people would be accommodated when practicable.
- The BLM will continue to implement government-to-government consultation with federally and non-federally recognized tribes on a case-by-case basis for site-specific proposals which would help determine other issues of concern, including but not limited to access rights, disruptions of cultural practices, impacts on visual resources important to the tribes, and impacts on subsistence resources. It should be noted that even when consultation and an extensive inventory or data collection occur, not all impacts on tribally sensitive resources can be fully mitigated.

4.15.2 Impacts Common to All Alternatives

The RFD Scenario identifies a number of potential actions that could pose effects to cultural and historical resources in the CCFO Planning Area. The RFD Scenario states that between zero and 32 development wells and three to five exploratory wells could be expected over 15 years on Federal mineral estate. Associated with these wells are certain levels of surface-disturbing work including well pads (1 to 3 acres per well), roads (40 feet wide and 4.8 miles long per well location), pipeline (20 feet wide corridor and 0

to 10 miles in length), and related facilities for those wells that lead to development (zero to eight facilities at 1 acre per facility). The roads would be a 20-foot-wide gravel surface bordered by ditches, cuts, and fill. Total surface disturbance for each well is estimated to be 5.4 acres. The RFD Scenario also identified potentially up to 34 miles of seismic exploration work. The drill hole method of geophysical exploration could involve use of truck-mounted or portable air drills drilling four to 12 holes per mile of line and an explosive charge placed in each hole. Vehicles may include heavy truck-mounted drill rigs, track-mounted drill rigs, water trucks, computer recording trucks, and light pickups. Travel would use existing roads or disturbed areas, to the extent feasible. Overall, the RFD Scenario projects between 22.45 and 205.7 acres of disturbance. Development of new producing fields is not likely to occur on Federal mineral estate in the CCFO Planning Area as a result of the exploratory wells. Well stimulation treatment operations are expected to occur entirely within the well pad disturbance area but would increase vehicle presence involving control vans, pump trucks, a flatbed truck, a tanker, crane water trucks, sand trucks, and a manifold/treating iron trailer. Number of vehicles would vary depending on if an enhanced oil recovery (EOR) technique was employed. An assumption of this analysis is that the same level of activity is associated with each of the five Alternatives identified in Chapter 2.

Many of the ground disturbing actions could affect pre-historic and historic resources. An effect is considered adverse when the effect on a National Register-eligible property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association. These effects are commonly caused by direct impacts of soil-disturbing activities or indirect impacts through visual or auditory intrusions. Adverse effects include the physical destruction of all or part of the property. Adverse effects on historic properties resulting from oil and gas development and exploration can include, but are not limited to:

- Physical destruction or alteration of all or part of the property;
- Isolation of the property from or alteration of the property's setting when that character contributes to the property's qualifications for listing in the National Register;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting; or
- Unauthorized collection of artifacts by fieldworkers associated with the project

Many of the surface disturbing actions identified in the RFD Scenario could result in adverse effect determinations for purposes of compliance with Section 106 of the NHPA. According to 36 CFR 800.9(a), "an undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register."

If ground disturbance from oil and gas development occurred at locations of known cultural resources such as those identified in Section 3.15.4 (Current Conditions or Trends) or at locations of unknown cultural resources, these adverse effects would be permanent and direct impacts on the resource because the sites are non-renewable resources that can be irretrievably lost if subject to certain management actions. As described in Section 3.15, the most likely sites to be encountered during oil and gas activities are prehistoric archaeological sites. For this area, the most common site types include residential occupation sites, often found in proximity of water sources such as rivers and springs, and small special use sites found in upland settings. The larger residential sites may also include human burials. Native American traditional use locations and built-environment sites are much less likely to be encountered. Establishment of a limited surface use stipulation for fluid mineral development based on the presence of recorded, eligible cultural resources within newly leased parcels can achieve avoidance for those resources that have surface cultural indicators, or that are important due to their cultural use. When avoidance is not feasible, the effects can be mitigated by a variety of methods based on the type of site and proposed action. The selected method(s) is determined by consultations between the Federal agency, SHPO, and the ACHP with applicable Native American tribes and the public as necessary. Mitigation for impacts to archaeolog-

ical sites is often the recovery of a site's scientific data potential through excavation and archaeological study. Mitigation for built-environment properties is most often historical and architectural documentation prepared in accordance with Historic American Building Survey, Historic American Engineering Survey, or similar programs, in combination with interpretation of the property for purposes of public education and awareness.

When avoidance of adverse effects on historic properties is not feasible or when they inadvertently occur in spite of site protection and preservation management practices, procedures identified in Section 9.0 of the Revised 2014 California *State Protocol Agreement* shall be employed to develop appropriate mitigation measures as necessary to resolve adverse effects under Section 106 (NHPA).

4.15.3 Impacts of Alternative A (No Action)

Alternative A includes 683,800 acres of Federal mineral estate in the CCFO Planning Area open for development and 41,700 acres designated for no surface occupancy (NSO). Despite NSO stipulations applied in some areas, the potential for impact to historic properties still remains due to their potential to be buried with few surface indicators. Impacts posed by Alternative A are the same as Impacts Common to All Alternatives. However, the varying acreages associated with each alternative indicates the potential concentration of oil and gas exploration and development since a similar amount of activity is assumed for each alternative. Compliance with Section 106 of the NHPA is intended to promote the protection and preservation of historic properties so that authorized use of public lands would not result in adverse impacts to NRHP-eligible archaeological sites, traditional cultural properties, or built-environment resources. However, when avoidance of adverse impacts is not feasible due to overriding project or land use considerations, mitigation measures may be implemented as outlined below. Such an analysis recognizes the importance of government-to-government consultation with Native American tribes and other concerned parties on specific undertakings involving various authorized land uses. Authorized uses with high potential to directly affect historic properties include new oil and gas leasing, mineral extraction and exploratory actions, road and pipeline construction, and facilities construction.

Mitigation

Best Management Practices / Standard Operating Procedures are provided in Appendix D including those for Cultural Resources. The practices and procedures most relevant to the treatment of cultural resources including mitigation measures include:

- No construction or surface-disturbing activities shall occur without prior written authorization of the authorized BLM officer based, in part, on completion of compliance with Section 106 of the NHPA and other related authorities.
- Identification, safe avoidance, or mitigation of potential adverse effect on cultural properties shall be required as a condition of a lease or permit associated with oil and gas development.
- Where avoidance or adequate protection is not feasible and the property is significant for the scientific data it may contain, initiate a data retrieval (excavation) of sites.
- Surface disturbance will be minimized as project applicants will be encouraged to utilize previously disturbed sites when feasible.
- Work area boundaries will be delineated with flagging, temporary fencing, or other marking.
- Resource protection may include installation of fencing, protective barriers, or site capping to minimize surface disturbance or impacts on culturally sensitive resources; the potential of certain protective measures (e.g., fencing) that may draw unwanted attention to sites or inadvertently restrict access to traditional use areas shall be considered.

- BLM will continue open dialogue and share information through government-to-government consultation with federally recognized tribes and with other Native Americans and ethnic groups that have cultural ties to lands proposed for development.
- The presence or absence of cultural properties will be determined prior to the approval of any surface-disturbing activity through such means as cultural resource field inventories, archival research, oral history, or other data gathering means deemed appropriated and evaluations of identified resources shall be evaluated and appropriate treatment measures identified for all project areas subject to surface disturbance or visual intrusions.
- When cultural properties are present, the project would be redesigned or modified to the extent feasible to safely avoid impacting cultural sites or steps taken to adequately mitigate impacts through project redesign or data recovery.
- During periods of high rainfall and runoff or when soils are wet and muddy, soil-disturbing activities shall be avoided in order to minimize impacts to nearby culturally sensitive resources vulnerable to soil erosion.
- Discovery during construction activities of a cultural resource or of Native American human remains and/or related cultural items pursuant to NAGPRA shall be reported to the authorized officer and all activity in the immediate discovery area associated with the project be suspended until an evaluation of the discovery is made by the archaeologist to determine appropriate actions to prevent further disturbance of remains and related cultural items or the loss of significant cultural or scientific values. A written authorization to resume the project, or to take appropriate mitigation action, will be issued by the authorized officer.
- Additional archaeological or cultural surveys and further consultation with tribes will be required in the event a proposed project or its location is changed or modified after the consultation, initial survey is completed; the inventory, associated documentation, and necessary compliance would be completed prior to project approval.

Leases Subject to Settlement Agreement – Subalternative 1

The record search did not identify resources located in these parcels. The same procedures for identification, evaluation, and protection described in Section 4.15.1 would apply to these parcels.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impacts would occur, and therefore, the procedures for identification, evaluation, and protection described in Section 4.15.1 would not be applicable.

4.15.4 Impacts of Alternative B

Alternative B consists of over 39,000 acres open for development with CSU stipulations, the least amount of acreage open for oil and gas development and only 5 percent of the amount in Alternative A. As a result, potential oil and gas development activities will be more concentrated, and potentially would use more land that was previously disturbed because it would be located within existing oil and gas fields and a buffer around these fields. The types of impacts to cultural resources would be the same as described for Alternative A.

Mitigation

The mitigation measures identified for Alternative A would remain the same for Alternative B.

Leases Subject to Settlement Agreement

The same procedures for identification, evaluation, and protection described in Section 4.15.1 would apply to these parcels.

4.15.5 Impacts of Alternative C

Alternative C consists of approximately 368,800 acres open for development with CSU stipulations and 29,800 acres open with NSO. This area is 55 percent the amount in Alternative A. As a result, potential oil and gas development activities would be more concentrated than in Alternatives A and E, but much less concentrated than Alternatives B and D.

Mitigation

The mitigation measures identified for Alternative A would remain the same for Alternative C.

Leases Subject to Settlement Agreement

The same procedures for identification, evaluation, and protection described in Section 4.15.1 would apply to these parcels.

4.15.6 Impacts of Alternative D

Alternative D consists of 121,200 acres open for development with CSU stipulations and 16,400 acres open with NSO. This area is about 14 percent the amount in Alternative A. As a result, potential oil and gas development activities would be considerably more concentrated than in Alternatives A, C, and E.

Mitigation

The mitigation measures identified for Alternative A would remain the same for Alternative D.

Leases Subject to Settlement Agreement

The same procedures for identification, evaluation, and protection described in Section 4.15.1 would apply to these parcels.

4.15.7 Impacts of Alternative E

Alternative E consists of 487,200 acres open for development with CSU stipulations and 206,400 acres open with NSO. This area is 96 percent the amount in Alternative A. As a result, potential oil and gas development activities would be concentrated about the same.

Mitigation

The mitigation measures identified for Alternative A would remain the same for Alternative E.

Leases Subject to Settlement Agreement

The same procedures for identification, evaluation, and protection described in Section 4.15.1 would apply to these parcels.

4.16 Paleontological Resources

This section analyzes the potential impacts of five alternatives for the Central Coast Oil and Gas Leasing and Development RMPA/EIS for the CCFO Planning Area, including the Leases Subject to Settlement Agreement. Section 4.16.1 provides the impact methodology used for this analysis. Section 4.16.2 outlines the direct and indirect impacts common to all RMPA alternatives, and Sections 4.16.3 through 4.16.7 provides impacts for RMPA Alternatives A through E as well as appropriate measures to avoid or reduce adverse effects on paleontological resources. Refer to Section 5.3.15 for the evaluation of cumulative impacts associated with paleontological resources. Finally, Chapter 7 provides references cited for the RMPA/EIS analysis.

The management goals for paleontological resources under the 2007 Proposed RMP also apply to this RMPA/EIS. The goals aim to:

(1) preserve, protect and manage fossilized vertebrates, noteworthy invertebrates, and plants in accordance with existing laws and regulations for current and future generations;

(2) facilitate the appropriate scientific, educational, and recreational uses of paleontological resources such as research and interpretation;

(3) accommodate permit requests for scientific research by qualified individuals or institutions; and

(4) ensure proposed land uses do not destroy or damage paleontological resources (BLM, 2007b).

4.16.1 Introduction

The loss of any identifiable fossil that could yield information important to prehistory, or that embodies the distinctive characteristics of a type of organism, environment, period of time, or geographic region, would be an adverse environmental impact. Direct impacts on paleontological resources primarily concern the potential destruction of non-renewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information (adverse impact). Impacts under NEPA (42 USC 4321 and 4331-4335) are defined by the Council on Environmental Quality regulations and require consideration of the temporal scale, spatial extent, and intensity of the change that would be introduced by the RMPA alternatives. At the project-specific level, adverse impacts can be minimized through the implementation of paleontological mitigation, including systematic identification, documentation, curation, avoidance, or protection from damage or destruction. Mitigation of adverse impacts to paleontological resources is consistent with the purpose of the PRPA (16 USC 470aaa et seq.), Antiquities Act of 1906 (16 USC 431-433), and other pertinent regulations, as discussed in Section 3.16.2.

Approach to Impact Assessment

In general, for Federal mineral estate within the bounds of oil and gas fields which are underlain by paleontologically sensitive geologic units (i.e., PFYC 3-5), the greater the amount of ground disturbance, the higher the potential for adverse impacts to paleontological resources. For those areas directly underlain by geologic units with very low to low paleontological sensitivity (i.e., PFYC 1-2), there is low to negligible potential for impacts on paleontological resources unless sensitive geologic units which underlie the marginally sensitive unit(s) are also impacted.

Direct impacts result from ground-disturbing activities related to oil and gas development. These impacts occur at the same time and place as the surface disturbing action. The potential for direct impacts on scientifically significant surface and subsurface fossils in fossiliferous sedimentary deposits is controlled by two factors:

(1) the depth and lateral extent of disturbance of fossiliferous bedrock and/or surficial sediments; and

(2) the depth and lateral extent of occurrence of fossiliferous bedrock and/or surficial sediments beneath the surface.

Ground disturbance has the potential to adversely affect an unknown quantity of fossils that may occur on or underneath the surface in areas containing paleontologically sensitive geologic units. Without mitigation, these fossils, as well as the paleontological data they could provide if properly salvaged and documented, could be adversely affected (destroyed), rendering them permanently unavailable for future scientific research.

Indirect impacts occur later in time or further away in distance than direct impacts, but are still reasonably foreseeable. They typically include those impacts which result from the normal ongoing operations of facilities constructed within a given project area. An example of an indirect adverse impact on paleontological resources would be the construction of a new road that increases public access to a previously inaccessible area, which results in unauthorized fossil collecting (i.e., poaching) and vandalism. Mitigation strategies could include periodic surveys by qualified paleontologists to collect significant surface fossils, transfer them to a public museum, and identify locations of fossil localities in the vicinity that have the potential to yield additional fossils as erosion occurs, and the construction of protective fencing or other barriers around known paleontological localities.

Assumptions

As described in Section 3.16.1, geologic units are considered "sensitive" if they are known to contain scientifically significant paleontological resources anywhere in their extent. The area of sensitivity is typically defined as the entire rock unit (formation or member thereof) and is not limited to areas where surface fossils may be exposed. Using the BLM's (2007a) PFYC sensitivity classification system, the major significant fossil-bearing units underlying the CCFO Planning Area were assigned a preliminary PFYC classification (i.e., sensitivity) based on the programmatic assessment in Chapter 3 (Affected Environment). These PFYC assignments are subject to revision and refinement as additional information becomes available.

The 2007 Proposed RMP set forth management actions for the protection of paleontological resources within the CCFO Planning Area (BLM, 2007b). Many of those actions are assumed to be appropriate for the mitigation of adverse impacts to paleontological resources that occur as the result of oil and gas development activities. These Management Actions are described below.

Paleontology Management Actions – Inventory, Monitoring, Avoidance

The BLM instituted guidelines for the management of paleontological resources in the General Procedural Guidance for Paleontological Resource Management Handbook (H-8270, H-8270-1) (1998a, 1998b) and Instruction Memorandums (IM) 2008-009 and 2009-011 (2007a, 2008), which establish criteria for the sensitivity and significance assessment (i.e., PFYC classification system) and mitigation of sensitive fossil resources. In accordance with these guidelines, in order to determine the paleontological sensitivity and impact potential for a given oil and gas development project, the appropriate CCFO representative must establish, in consultation with the BLM California State Office paleontologist, whether an inventory shall be conducted. The inventory, which would be performed by a qualified paleontologist and approved by BLM, would set forth PFYC and mitigation recommendations for the project. The final PFYC determination would be made by an authorized BLM officer. If a PFYC 3-5 area is identified during the inventory, impacts from oil and gas development activities could be mitigated to an acceptable level with appropriate measures provided in H-8270, H-8270-1, IM2008-009, and IM2009-011 (BLM, 1998a, 1998b, 2007a, 2008). Measures may include the creation of a buffer, avoidance, construction monitoring procedures, and curation, as specified in the required permitting documents associated with energy and minerals or other land use authorizations (BLM, 2007b).

Paleontology Management Actions – Preservation

The establishment of an Area of Critical Environmental Concern (ACEC) is a management strategy that promotes the preservation of paleontological resources. The Panoche/Coalinga ACEC is an example of a region in the CCFO Planning Area that has been set aside to protect paleontological resources that have particularly important scientific significance. Preservation, as defined in this RMPA/EIS, also includes accommodating permits for scientific research and protecting paleontological resources from inadvertent damage. The Paleontology Management Actions are outlined in Table 4.14-1.

Table 4.14-1. Summary of Paleontological Resources Management Actions for the RMPA Alternatives

Type of Preservation	Management Actions
Buffer around paleontological sites	Construct a 300-foot buffer to protect paleontological resources from inadvertent impacts or disturbance. (PALEO-C1)
Avoidance of disturbance	Protect all resources from inadvertent impacts from proposed land uses, including oil and gas development. (PALEO-COM2). This may include the temporary installation of temporary fences along margins of pad sites on oil and gas developments to eliminate off-site project-related vehicle impacts on undisturbed areas. (PALEO-C2).
Site-specific mitigation: reconnaissance survey, construction monitoring, recovery, and curation	Reduce adverse impacts to paleontological resources through site-specific mitigation procedures such as surveying, construction monitoring, resource recovery and curation. (PALEO-C2)
Preservation	Accommodate permit requests for scientific studies issued by the State office and preserve all significant fossil resources by avoidance, fossil recovery, or stabilize soils from erosion; establishment of ACEC. (PALEO-COM1 and PALEO-C3)

Source: BLM, 2007b

Best Management Practices / Standard Operating Procedures

Best Management Practices (BMPs) / Standard Operating Procedures for the CCFO Planning Area are provided in Appendix D. The practices and procedures most relevant to the treatment of paleontological resources are provided below.

The following BMPs will be applied to all BLM undertakings and authorizations:

- No construction or surface-disturbing activities shall occur without prior written authorization of the authorized BLM officer.
- Surface disturbance will be minimized. Project applicants will be encouraged to utilize previously disturbed sites when feasible.
- Authorizations for new surface-disturbing activities will place priority on avoiding impacts to paleontological resources. Avoidance will employ measures such as relocation of project sites, modifying construction techniques, and altering project timing.
- Delineate work area boundaries with flagging, temporary fencing, or other marking to minimize surface disturbance or impacts on sensitive paleontological resources.
- When necessary to protect sensitive paleontological resources, monitoring by BLM-approved paleontologists shall be required during construction activities.
- Avoid soil-disturbing activities during periods of high rainfall and runoff or when soils are wet and muddy in order to minimize impacts to paleontological resources.
- Any discovery of a paleontological resource during a project would be reported to the authorized officer. All activity in the immediate discovery area associated with the project would be suspended until an evaluation of the discovery is made by the BLM-approved paleontologist to determine appropriate

actions to prevent the loss of significant paleontological or scientific values. A written authorization to resume the project, or to take appropriate mitigation action, would be issued by the authorized BLM officer.

- It is the policy of the BLM (1) to avoid impacts on significant paleontological resources and traditional properties and values whenever possible and (2) to avoid inadvertent loss or destruction of paleontological resources by BLM actions or authorizations.

Other Management Actions

Paleontological resources would benefit from soil resource management actions that control erosion and avoid surface disturbance on steep slopes or during wet periods. Due to high erosion rates on steep slopes in the CCFO Planning Area, soil resource management actions would reduce potential impacts to significant paleontological resources from moderate and minor to negligible and would cause a beneficial impact by mitigating the constant exposure of subsurface materials, including new fossils. If exposed for long periods of time, these fossils would erode from the confining sediments and gradually deteriorate. Management actions, such as installing temporary fences, maintaining buffer zones, relocating resources, and stabilizing and rehabilitating soils, would help mitigate erosion and prevent inadvertent damage or exposure of paleontological resources.

4.16.2 Impacts Common to All Alternatives

The Reasonably Foreseeable Development (RFD) Scenario for oil and gas in the CCFO Planning Area identifies a number of potential actions that could result in adverse impacts to paleontological resources due to oil and gas development. The RFD Scenario states that between zero and 32 development wells and three to five exploratory wells could be expected over 15 years on Federal mineral estate. Associated with these wells are certain levels of surface disturbing work, including well pads (1 to 3 acres per well), roads (40 feet wide and 4.8 miles long per well location), pipeline installation (20 feet wide corridor and 0 to 10 miles in length), and related facilities (zero to eight facilities at 1 acre per facility). The RFD Scenario also identifies up to 34 miles of seismic exploration work. Overall, the RFD Scenario projects include between 22.45 and 205.7 acres of disturbance. Well stimulation treatment operations are expected to occur entirely within the well pad disturbance area but would increase vehicle presence involving control vans, pump trucks, a flatbed truck, a tanker, crane water trucks, sand trucks, and a manifold/treating iron trailer. An assumption of this analysis is that the same level of activity is associated with each of the five alternatives identified in Chapter 2.

The potential to discover paleontological resources during activities related to oil and gas development under the five RMPA alternatives in the CCFO Planning Area ranges from low to high based on the location of ground-disturbing activities. The amount of ground disturbance would likely be greatest for new well pads, especially within areas outside of existing fields, as well as site preparation and grading, excavations of pit and sumps, grading of access roads, well drilling, pipeline construction, geophysical exploration, and ancillary facility construction. Well stimulation technologies, such as hydraulic fracturing and acid matrix stimulation, have a low to negligible potential to adversely impact paleontological resources because:

(1) only limited new surface-disturbing activities (e.g., staging areas or temporary access roads and facilities for wastewater) are expected to result from these activities;

(2) subsurface hydraulic fracturing is considered to have a negligible effect to paleontologically sensitive geologic units because the widths of fractures are a fraction of an inch wide; and

(3) acid matrix stimulation could theoretically destroy buried fossil resources; however, many of the reservoir rocks are deeply buried and are unlikely to be recovered within their original context.

These adverse impacts would be reduced to an acceptable level with implementation of the Mitigation and Management Actions presented above under "Assumptions."

The impacts to paleontological resources for each Alternative are described in the following sections. Alternatives A through E are each largely underlain by geologic units identified as having moderate to high paleontological sensitivity (PFYC 3a – PFYC 5). Therefore, regardless of the total acreage per alternative, the impacts for each alternative are similar.

4.16.3 Impacts of Alternative A (No Action)

Alternative A includes approximately 683,800 acres of Federal mineral estate in the CCFO Planning Area open for oil and gas leasing with CSU stipulations and 41,700 acres open and subject to NSO lease stipulations. According to geologic mapping by Jennings and Strand (1958) and Wagner et al. (1991), Alternative A is underlain by 24 of the 31 major significant fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the Franciscan Assemblage, Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Avenal Sandstone, Kreyenhagen Formation, Markley Formation, Temblor Formation, Vaqueros Formation, Monterey Group, San Pablo Group, Oro Loma Formation, Santa Margarita Formation, Santa Cruz Mudstone, Jacalitos Formation, Purisima Formation, Etchegoin Formation, San Benito Gravels, Paso Robles Formation, Tulare Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5.

The potential to encounter paleontological resources during oil and gas development within Federal mineral estate under Alternative A ranges from low to high based on the location of ground-disturbing activities. Oil and gas leases within Federal mineral estate under Alternative A would be subject to construction-related ground disturbances such as site and well pad preparation, excavations of pit and sumps, grading of access roads, well drilling, and ancillary facility construction associated with oil and gas development.

Mitigation

The adverse impacts to paleontological resources under Alternative A would be reduced with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are underlain by 12 of the 31 major fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, Paso Robles Formation, and Quaternary Older Alluvium, which have a sensitivity classification ranging from PFYC 3a to 5. Adverse impacts to paleontological resources within the non-NSO leases would be reduced with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no paleontological resource impacts would occur.

4.16.4 Impacts of Alternative B

Alternative B includes approximately 39,000 acres of Federal mineral estate in the CCFO Planning Area open for oil and gas leasing with CSU stipulations. According to geologic mapping by Jennings and Strand (1958) and Wagner et al. (1991), Alternative B is underlain by 23 of the 31 major significant fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the

Franciscan Assemblage, Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Markley Formation, Temblor Formation, Vaqueros Formation, Monterey Group, San Pablo Group, Oro Loma Formation, Santa Margarita Formation, Santa Cruz Mudstone, Jacalitos Formation, Purisima Formation, Etchegoin Formation, San Benito Gravels, Paso Robles Formation, Tulare Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5.

The potential to discover paleontological resources during oil and gas development within Federal mineral estate under Alternative B ranges from low to high based on the location of ground-disturbing activities. Oil and gas leases within Federal mineral estate under Alternative B would be subject to construction-related ground disturbances such as site and well pad preparation, excavations of pit and sumps, grading of access roads, well drilling, and ancillary facility construction associated with oil and gas development.

Mitigation

The adverse impacts to paleontological resources under Alternative B would be reduced to an acceptable level with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement

Under Alternative B, BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are underlain by 12 of the 31 significant fossil-bearing geologic units described in Chapter 3 (Affected Environment). The units include the Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, Paso Robles Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5. Adverse impacts to paleontological resources within the non-NSO leases would be reduced to an acceptable level with implementation of the Paleontology Management Actions as described in Section 4.16.2.

4.16.5 Impacts of Alternative C

Alternative C includes approximately 368,800 acres of Federal mineral estate in the CCFO Planning Area open for oil and gas leasing with CSU stipulations and 29,800 acres open and subject to NSO lease stipulations. According to geologic mapping by Jennings and Strand (1958) and Wagner et al. (1991), Alternative C is underlain by 22 of the 31 major fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the Franciscan Assemblage, Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Markley Formation, Temblor Formation, Vaqueros Formation, Monterey Group, San Pablo Group, Oro Loma Formation, Santa Margarita Formation, Jacalitos Formation, Purisima Formation, Etchegoin Formation, San Benito Gravels, Paso Robles Formation, Tulare Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5.

The potential to encounter paleontological resources during oil and gas development within Federal mineral estate under Alternative C ranges from low to high based on the location of ground-disturbing activities. Oil and gas leases within Federal mineral estate under Alternative C would be subject to construction-related ground disturbances such as site and well pad preparation, excavations of pit and sumps, grading of access roads, well drilling, and ancillary facility construction associated with oil and gas development.

Mitigation

The adverse impacts to paleontological resources under Alternative C would be reduced to an acceptable level with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement

Under Alternative C, BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are underlain by 12 of the 31 major fossil-bearing geologic units described in Chapter 3 (Affected Environment). The units include the Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, Paso Robles Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5. Adverse impacts to paleontological resources within the non-NSO leases would be reduced with implementation of the Paleontology Management Actions as described in Section 4.16.2.

4.16.6 Impacts of Alternative D

Alternative D includes approximately 121,200 acres of Federal mineral estate in the CCFO Planning Area open for oil and gas leasing with CSU stipulations and 16,400 acres open and subject to NSO lease stipulations. According to geologic mapping by Jennings and Strand (1958) and Wagner et al. (1991), Alternative D is underlain by 21 of the 31 major significant fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the Franciscan Assemblage, Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Vaqueros Formation, Monterey Group, San Pablo Group, Oro Loma Formation, Santa Margarita Formation, Jacalitos Formation, Purisima Formation, Etchegoin Formation, San Benito Gravels, Paso Robles Formation, Tulare Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5.

The potential to encounter paleontological resources during oil and gas development within Federal mineral estate under Alternative D ranges from low to high based on the location of ground-disturbing activities. Oil and gas leases within Federal mineral estate under Alternative D would be subject to construction-related ground disturbances such as site and well pad preparation, excavations of pit and sumps, grading of access roads, well drilling, and ancillary facility construction associated with oil and gas development.

Mitigation

The adverse impacts to paleontological resources under Alternative D would be reduced to an acceptable level with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement

Under Alternative D, BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are underlain by 12 of the 31 major fossil-bearing geologic units described in Chapter 3 (Affected Environment). The units include the Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, Paso Robles Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5. Adverse impacts to paleontological resources within the non-NSO leases would be reduced with implementation of the Paleontology Mitigation and Management Actions as described in Section 4.16.

4.16.7 Impacts of Alternative E

Alternative E includes approximately 487,200 acres of Federal mineral estate in the CCFO Planning Area open for oil and gas leasing with CSU stipulations and 206,400 acres open and subject to NSO lease stipulations. According to geologic mapping by Jennings and Strand (1958) and Wagner et al. (1991), Alternative E is underlain by 22 of the 31 major significant fossil-bearing geologic units described in Chapter 3 (Affected Environment). These units include the Franciscan Assemblage, Panoche Formation, Moreno

Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Markley Formation, Temblor Formation, Vaqueros Formation, Monterey Group, San Pablo Group, Oro Loma Formation, Santa Margarita Formation, Jacalitos Formation, Purisima Formation, Etchegoin Formation, San Benito Gravels, Paso Robles Formation, Tulare Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5.

The potential to encounter paleontological resources during oil and gas development within Federal mineral estate under Alternative E ranges from low to high based on the location of ground-disturbing activities. Oil and gas leases within Federal mineral estate under Alternative E would be subject to construction-related ground disturbances such as site and well pad preparation, excavations of pit and sumps, grading of access roads, well drilling, and ancillary facility construction associated with oil and gas development.

Mitigation

The adverse impacts to paleontological resources under Alternative E would be reduced to an acceptable level with implementation of the Paleontology Management Actions as described in Section 4.16.2.

Leases Subject to Settlement Agreement

Under Alternative E, BLM-managed areas that contain the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, are underlain by 12 of the 31 major fossil-bearing geologic units described in Chapter 3 (Affected Environment). The units include the Panoche Formation, Moreno Formation, Laguna Seca Formation, Martinez Formation, Lodo Formation, Domengine Formation, Kreyenhagen Formation, Temblor Formation, Monterey Group, Oro Loma Formation, Paso Robles Formation, and Quaternary Older Alluvium, which have sensitivity classifications ranging from PFYC 3a to 5. Adverse impacts to paleontological resources within the non-NSO leases would be reduced with implementation of the Paleontology Management Actions as described in Section 4.16.2.

4.17 Social and Economic Conditions

4.17.1 Introduction

This section presents an analysis of social and economic impacts of the management alternatives proposed as part of the Central Coast Oil and Gas Leasing and Development RMPA. Each alternative is evaluated in light of oil and gas extraction forecasts for Federal mineral estate in the 2015 Reasonably Foreseeable Development (RFD) Scenario over the 15- to 20-year period of analysis. This analysis discusses potential effects to existing social patterns, employment, labor income, and sectors in the impact area economy that encompass the Central Coast Field Office (CCFO), with an emphasis on the areas designated as having high potential for oil and gas development shown in Figure 5-1. Environmental justice impacts to communities within the localized study area are also discussed.

The social analysis focuses on the interests and concerns of identified communities relative to the alternatives, particularly those identified during the Social and Economic Workshop held on February 4, 2015 (included as Appendix F of this EIS). The economic analysis focuses on the potential for RMPA alternatives to result in changes to the local economies affected by the oil and gas industry associated with the 2015 RFD Scenario by alternative (refer to Table 2-3). Continued employment patterns can be seen as a benefit to the local community. Other economic benefits are also present, although some are not easily measured or tied to economic activity. An example of where effects are difficult to quantify are equity effects, impacts to social values, and non-market values. Regardless, these are discussed at qualitative and programmatic level despite the inability to measure them quantitatively.

Methods of Analysis

In order to accurately portray the relationship of current BLM management and the community, the social and economic geographic scope of analysis must be defined. The social and economic effects from changes on Federal mineral estate feasibly extend beyond the immediate vicinity of their location. However, based on the information provided in Section 2.3, overall, the 2015 RFD Scenario assumes that the current development trends in this region are likely to continue for the next 15 to 20 years. It is estimated that during the life of this RMPA, 37 total exploratory and development wells would be developed on up to 206 acres. This estimate includes all anticipated forms of ground disturbance such as the construction of well pads, roads, onsite facilities, and pipelines. Well stimulation technologies (e.g., hydraulic fracturing, acid matrix stimulation, acid fracturing) and enhanced oil recovery techniques (e.g., cyclic steam, steam flood, water flood) may be used on any or all of the 37 wells during their life cycle.

When considering the existing oil and gas industry within the CCFO Planning Area, the local study area for social and economic impacts includes the portions of Fresno, Monterey, and San Benito Counties that encompass the area of high oil and gas occurrence potential shown in Figure 5-1. The local study area includes communities proximate to existing oil and gas development: the City of Coalinga (Fresno County), the cities of Greenfield and Kings City (Monterey County), and the communities of Bradley, San Ardo, and San Lucas (Monterey County). These local study area communities are also those identified as potentially affected social groups during the Social and Economic Workshop held on February 4, 2015 (BLM, 2015).

The programmatic analysis within this chapter is primarily qualitative and based on a set of indicators and attributes (many of which were identified in Section 3.17 for existing conditions). The analysis of oil and gas development effects on social and economic conditions is based on the following indicators:

- Demographic conditions in the regional and local study areas;
- Social conditions within the regional and local study areas pertaining to the oil and gas industry;
- Economic conditions in the regional and local study areas; and

The analysis of oil and gas development effects on social and economic conditions is based on the following attributes:

- Direct oil and gas-related employment;
- Secondary jobs related to oil and gas;
- Total population in regional and local study areas and population by location;
- Direct and indirect revenue resulting from the BLM-managed activities;
- Direction, magnitude and rate of change in social and economic conditions; and
- Geographic concentration of land use, demographic, and economic changes.

Environmental justice impacts are evaluated by identifying populations, communities or groups that contain a high number of minority or low-income population (based on the data presented in Section 3.17) that could be subject to disproportionate adverse effects of BLM oil and gas management actions identified for RMPA alternatives.

Assumptions

The following assumptions were used to complete the analysis for social and economic impacts from the proposed RMPA:

- Future environmental analyses would be conducted, as appropriate, for project- and site-specific actions proposed in the CCFO Planning Area administrative boundary. Applications for Permit to Drill would address potential social and economic effects of oil and gas development on identified affected communities.
- Social and economic effects are based on the assumption of full implementation of the 2015 RFD Scenario on the varying BLM land designations allowing for leases on BLM-administered mineral estate by alternative.
- As described in Section 2.5.2, the same range of oil and gas development under the 2015 RFD Scenario (i.e., up to 37 exploratory and development wells on up to 206 acres of disturbance) would apply to all alternatives except Alternative B, which would include only up to 32 wells drilled.
- All surface-disturbing activities related to the 2015 RFD Scenario would most likely occur on BLM-administered mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO Planning Area but may potentially occur anywhere that is open to oil and gas leasing.
- New oil and gas well locations developed under the 2015 RFD Scenario would most likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities but may potentially occur anywhere that is open to oil and gas leasing.
- Development of ancillary oil and gas facilities (e.g., pipelines, compressor stations, etc.) are assumed to be proportional to number of new wells developed. A total of 37 exploratory and development wells under the 2015 RFD Scenario would primarily utilize existing pipeline infrastructure and refineries.

4.17.2 Impacts Common to All Alternatives

Oil and Gas Development Social Effects

As discussed in Section 2.3, under the 2015 RFD Scenario a maximum of 37 exploratory and development wells would occur on new Federal oil and gas leases over the next 15 to 20 years. As discussed in Section 3.17 (Table 3.17-2), active oil and gas wells on Federal mineral estate account for only 110 (0.6%) of the total 18,229 active wells within the CCFO Planning Area. The increase of 37 new wells occurring under the 2015 RFD Scenario for all alternatives would continue to account for a negligible number of total wells within the CCFO Planning Area occurring on Federal mineral estate.

It is likely that current oil and gas companies operating within the CCFO Planning Area would undertake all new wells. Therefore, the 2015 RFD Scenario is not expected to create a significant number of new jobs or induce population to new lease areas from employment. However, any new amount of long-term

direct or indirect job creation and associated population in-migration that may occur at this programmatic scale would depend on the number of new wells created and frequency of stimulation treatments at existing wells (as a result of RMPA approval).

Employment

Changes in employment patterns within a community can have a direct and indirect effect on many social conditions. Because both the regional and local study areas contain significant existing oil and gas development, when considering the oil and gas activities occurring under the 2015 RFD Scenario for all alternatives, one key component to analyze for social and economic effects is any change in employment patterns or levels. The development of an individual well and potential stimulation activities do not typically require large numbers of on-site employees for extended periods. Table 4.17-1 provides a summary of typical workforce and timeline for well development and stimulations.

Table 4.17-1. Typical Oil and Gas Well Development and Stimulation Treatment in California

Oil and Gas Activity	Timeline	Workforce
Oil and Gas Well Development	Exploration: 3–5 years Planning: 1–1.5 years Site and well construction: 2–3 months Well completion: 1–2 days	8-10 Persons
Well Stimulation Treatment	Total stimulation treatment: 10 days Total work hours: 16 Work hours per stage (up to 5 stages):[1] 30–60 minutes	2-5 Persons

1 - Within the Monterey Formation, wells are expected to be much deeper, with up to 20 hydraulic fracturing stages executed.
Source: DOC, 2015

During well development, exploration and planning activities occur temporarily during the 3- to 5-year and 1- to 1.5-year timeframes shown in Table 4.17-1, respectively. For both well and well stimulation activities, with the exception of any specialized labor needs, it is likely any new employees necessary for creation of new wells would already be residents in the regional or local study areas and are not expected to contribute to an increase or change in population or demographic makeup. New well development and stimulation activities occurring under the 2015 RFD Scenario within an existing oil and gas field, or at new locations, would not all occur at the same time. Therefore, workforce needs would fluctuate. Wells are developed individually and need various services at various times. This variability and the need to schedule services would reduce the potential for new employment and associated worker in-migration, as employers would first make efficient use of existing employees. Therefore, the oil and gas activities and well development intensity identified under the 2015 RFD Scenario would not introduce new population at a level that could adversely alter existing or projected population, housing demand, or demographic makeup of affected communities.

Social Disruption

As discussed within Section 3.17, the southern portion of the CCFO Planning Area has a number of well-established oil and gas fields and development areas that have shaped the social landscape of communities located proximate to them. The development of new wells and stimulation treatments under the 2015 RFD Scenario are expected to occur within or proximate to these existing fields within the CCFO Planning Area. Therefore, the oil and gas activities and well development intensity identified under the 2015 RFD Scenario would not introduce any new activities or industry that could adversely impact or change the existing social framework of affected local communities.

With such a relatively small labor force needed for a typical well development and stimulation treatment, minimal long-term population in-migration from new employment is expected. It is possible some specialized workers could come from outside the regional and local study areas. However, these workers are expected to seek lodging proximate to the work areas, which is assumed to be local study area com-

munities where social values and structure is already influenced by the oil and gas industry. Therefore, the presence of temporary oil and gas workers is not expected to disrupt existing social conditions or values of affected communities. While some CCFO Planning Area community interests likely would consider continued energy development to diminish quality of life, it is assumed the local study area communities identified in Section 3.17, Table 3.17-3, would not due to their communities developing with a continued oil and gas industry presence.

Oil and Gas Development Economic and Fiscal Effects

The oil and gas activities and well development intensity identified under the 2015 RFD Scenario would include the continued use of drilling-related employees of the energy development companies operating in the CCFO Planning Area and subcontract workers primarily in the oil and gas and construction industries. In addition to direct jobs associated with drilling and operating oil and gas wells and related infrastructure, oil- and gas-related economic activity would support other secondary jobs established in the local communities. These jobs result from:

- Both indirect economic effects of oil and gas activity (purchases of goods and services by energy companies and their subcontractors)
- Induced economic effects (purchases of household goods by the employees of energy companies, subcontractors and indirectly affected firms).

Based on the data shown in Section 3.17, the greatest proportion of secondary jobs currently occur within the local study area (Monterey County, Fresno County, and San Benito County) and local study area communities (Coalinga, Greenfield, King City, Bradley CDP, San Ardo CDP, and San Lucas CDP) due to extensive oil and gas activity in the area of high oil and gas occurrence potential within the CCFO Planning Area. The local study areas discussed in Table 3.17-3 represent the areas where a number of oil and gas workers are expected to reside and direct and indirect economic effects are prevalent. The continued direct and indirect economic effects from oil and gas activities and worker wages and spending under the 2015 RFD Scenario is considered a beneficial impact, particularly within local study area communities that have established economies influenced by oil and gas activities.

Table 3.17-4 summarizes recent economic and fiscal contributions of the oil and gas industry within Monterey County, Fresno County, and San Benito County (local study area) where new oil and gas wells developed under the 2015 RFD Scenario would most likely be located within. As shown in Table 3.17-4, as the number of total oil and gas wells per county is increased, the average economic and fiscal contribution per well decreases. Therefore, new wells occurring under the 2015 RFD Scenario are estimated to have the greatest beneficial economic effect in San Benito County, second greatest in Monterey County, and less in Fresno County. However, beneficial economic effects would occur as part of each new well developed. As noted in Table 3.17-4, a number of employment sectors are included as part of the direct employment, with secondary and induced sectors incurring benefits from oil and gas development through direct employee wage spending, operations and maintenance expenditures, and through government use of tax revenue.

To varying degrees, oil and gas development involving Federal mineral estate within the CCFO Planning Area would foster economic development within affected communities. The commercially viable oil and gas resources would, however, be exhausted within a finite time period. The longer-term sustainability and viability of community investments incurred to provide housing and other public services for the direct energy workforce (and the secondary workers supported by that workforce) would depend on the ability of the affected communities to diversify the local economic base over time.

Split Estate Leases

BLM issues a number of lease types for oil and gas extraction, with leases either being competitive or non-competitive. In split estate situations, the surface rights and subsurface rights (such as the rights to develop minerals) for a piece of land are owned by different parties. The BLM's split estate policy only

applies to situations where the surface rights are under private ownership and the rights to development of the mineral resources are publicly held and managed by the Federal government (in this case the BLM). In these situations, mineral rights are considered the dominant estate, meaning the owner of the mineral estate has the right to enter and occupy as much of the surface as is reasonably necessary to explore, drill, and remove the oil and natural gas resource on the leasehold, subject to obtaining the BLM's approval of the drilling and surface use plans (BLM, 2007). However, the mineral owner must conduct operations to minimize adverse effects to surface and subsurface resources and prevent any unnecessary surface disturbance (BLM, 2007).

Because split estate leases include privately owned surface lands, they can result in direct and indirect economic effects on landowners and local governments. By issuing a split estate lease, the development of oil and gas activities within the leased area can preclude the existing or planned surface land uses. While split estate leases are negotiated with the affected surface owner, they would affect revenue and taxes potentially generated by the precluded existing or planned surface land uses. Lease sales and fees generate revenue for the BLM. Split-estate leases are considered to have the greatest potential for economic effects to local jurisdictions and private parties due to land use incompatibilities and/or land use conversion. This was the primary issue raised by participants during the Social and Economic Workshop held on February 4, 2015 (BLM, 2015).

Non-market Values

Non-market values are associated with several of the resources managed by the BLM in the CCFO Planning Area, as well as with recreation and open space on both public and private lands. Non-market values include the benefits received by people from participating in recreational/tourist activities and the overall high-value visual context of these lands throughout the CCFO Planning Area. Additionally, individuals derive passive or non-use benefits from the existence of abundant wildlife, waterways, scenic resources, and extensive agricultural lands with little development and other amenities in many areas within the CCFO Planning Area. Both tourism and recreation have market components individually, which are heavily affected by BLM land use decisions within the CCFO Planning Area.

All areas currently closed to oil and gas leasing under the 2007 Hollister Field Office RMP would remain closed under all alternatives. Additionally, all areas designated as No Surface Occupancy (NSO) would further maintain and perhaps enhance non-market values associated with natural amenities protected on these lands. The BLM management decisions occurring under the existing RMP that offer more protection for the following resource categories (unchanged by the proposed amendment) provide protection for non-market values and non-quantifiable benefits:

- Special status species;
- Wild and Scenic Rivers;
- Cultural resources;
- Paleontological resources;
- Agricultural resources;
- Visual resources; and
- Recreation resources.

Oil and Gas Development Environmental Justice Effects

In analyzing potential environmental justice impacts, the U.S. Census data for minority and low-income populations in Section 3.17 was used. For this analysis, a population is considered a potential environmental justice population if the percentage of the minority or low-income population of the potentially affected area is significantly greater than the corresponding percentage of the population in the larger jurisdiction or region in which it is located. As discussed earlier, it is assumed most surface-disturbing activities related to the 2015 RFD Scenario would likely occur in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential shown in Figure 5-1 for the CCFO Plan-

ning Area. As described in Section 3.17.3, all three of these counties are considered minority areas of concern with respect to environmental justice. Both Fresno and Monterey Counties are also considered low-income areas of concern. Additionally, the development of new wells and stimulation treatments under the 2015 RFD Scenario are expected to occur within or proximate to existing oil and gas fields within the CCFO Planning Area. Based on these assumptions, the areas with potentially elevated environmental burdens from oil and gas extraction activities and vulnerable populations are the local study area communities of King City, San Ardo, and San Lucas (based on baseline data presented in Chapter 3.17, Table 3.17-3). Additionally, Coalinga is considered to have a high percentage of low-income population for consideration of environmental justice at the local study area level.

The location of existing oil and gas fields is dependent on the location and availability of underground hydrocarbon resources and the characteristics of geologic formations. The location of underground resources dictates where oil and gas wells are developed, and where well stimulation may occur. Most of the existing fields in the CCFO Planning Area are decades old, with some nearly a century old. Therefore, the presence of these oil and gas fields has been static in relation to the development and changes of the population around them. In particular, the demographic makeups of Coalinga, King City, San Ardo, and San Lucas have developed over time with nearby oil and gas fields present throughout. Activities that would occur under the 2015 RFD Scenario already occur at a greater magnitude within existing fields under existing conditions. Therefore, RMPA activities would not introduce new types of environmental impacts not already occurring from current well drilling, extraction, and stimulation treatments.

The major consideration is whether any adverse impacts from oil and gas activities under the 2015 RFD Scenario would be borne disproportionately by these communities when compared to the general population of the region. An important aspect when considering disproportionate effects within these communities over existing conditions is the life cycle of existing oil and gas extraction. As the availability of oil and gas resources decline, production decreases. Any adverse impacts from current field activities, including well stimulations, also would decrease as compared to periods of higher oil and gas production. As most of the recoverable resource is removed, well stimulation is no longer effective in increasing flow to a level that would justify its continued use. Therefore, as new activities (and any adverse impacts) that occur under the 2015 RFD Scenario are introduced, existing activities (and any adverse impacts) would be reduced as production declines and wells are decommissioned. Given the small number of new wells (up to 37) and land disturbed (up to 206 acres) under the 2015 RFD Scenario, this offsetting may not introduce any new or disproportionate adverse environmental impacts over existing conditions within the communities of Coalinga, King City, San Ardo, and San Lucas.

Existing Mitigation Strategies

A number of existing BLM and California permit procedures, environmental analyses requirements, BMPs, and other processes are currently in place or being planned to directly and indirectly mitigate the adverse effects of oil and gas development. These requirements would apply to all future environmental analyses, wells, well stimulations, and other enhanced oil recovery techniques occurring under the 2015 RFD Scenario on Federal mineral estate for all alternatives, and would reduce adverse social, economic, and environmental justice effects. These programs and requirements include, but are not limited to:

- BLM Land Use Planning Handbook, Appendix D: currently available for viewing at [http://www.blm.gov/style/meDialib/Blm/Ca/Pdf/Pa/Planning.Par.45838.File.dat/landuse_hb.pdf]
- The BLM Oil and Gas Management Program: currently available for viewing at [http://www.blm.gov/ca/st/en/prog/energy/og/electronic_permittin.html]
- BLM Approved Resource Management Plan Amendments/Record of Decision for Designation of Energy Corridors on Bureau of Land Management–Administered Lands in the 11 Western States: currently available for viewing at [http://corridoreis.anl.gov/documents/docs/Energy_Corridors_final_signed_ROD_1_14_2009.pdf]

- California Department of Oil, Gas & Geothermal Resources (DOGGR) Laws and Regulations: currently available for viewing at [http://www.conservation.ca.gov/dog/pubs_stats/Pages/law_regulations.aspx]
- DOGGR Well Stimulation Treatment Final Regulations: currently available for viewing at [ftp://ftp.consrv.ca.gov/pub/oil/laws/Final%20Text%20of%20SB%204%20WST%20Regulations.pdf]

4.17.3 Impacts of Alternative A (No Action)

Under Alternative A, approximately 725,500 acres of Federal mineral estate would be open to oil and gas leasing with CSU or NSO stipulations. This alternative maintains the management direction of the 2007 HFO RMP under which all Federal mineral estate would be available for oil and gas leasing with the exception of 67,500 acres of exclusion areas (i.e., Wilderness Areas, Wilderness Study Areas, Clear Creek Serpentine ACEC, and Fort Ord National Monument).

Alternative A would designate the largest acreage of Federal mineral estate open to leasing, which would provide the BLM with greater flexibility in identifying sites for locating ground disturbance activities. Under Alternative A, more BLM-administered mineral estate is available for locating the 37 future wells under the 2015 RFD Scenario. While utilizing a larger management area may avoid concentrating disturbance impacts in a given area, it is unlikely new wells would be developed outside areas currently producing. Social and economic effects of Alternative A would be negligible in the regional and local study areas relative to existing conditions. Based on the small number of wells developed on BLM-administered mineral estate over the 20-year 2015 RFD Scenario, negligible direct and secondary jobs would be added due to increased oil and gas development under Alternative A.

Under Alternative A, split estate leases are possible under the 2015 RFD Scenario as all areas currently open would remain open to oil and gas leasing. As discussed in Section 4.17.2, split estate leases can have adverse effects to private landowners and local jurisdictions should the direct and indirect economic effects on land owners and local governments should they preclude existing or planned land uses and result in potential effects to the economic/social goals and direction sought by the local jurisdiction for the area. Under Alternative A, existing BLM management strategies during split estate lease negotiations and processing would occur.

Within both the regional and local study areas of the CCFO Planning Area, there are different groups (such as farmers, recreationists, and energy workers) that could have differing values and objectives concerning the use of public lands for oil and gas extraction. Conflicts between these differing values and objectives are likely to be exacerbated by changes such as population growth, shifting demographics, localized land development and planning, and increasing energy-related activity. However, future environmental analyses, necessary permits, and continued adherence to BLM best management practices (BMPs) and programs linked to energy development are intended to mitigate adverse social effects during the 2015 RFD Scenario.

With respect to environmental justice, the BLM does not manage environmental justice resources. Rather, it manages public lands and the resources and uses that occur on them. As discussed in Section 4.17.2, the groups most likely to suffer adverse effects under Alternative A are the local study area communities of King City, San Ardo, and San Lucas, which contain a disproportionately high concentration of minority and low-income populations when compared to the larger region. However, as discussed in Section 4.17.2, the environmental effects from oil and gas extraction already occur within these areas. Any adverse effects from the development of 37 wells on 206 total acres over the next 20-years are not considered to be disproportionately higher in intensity than that occurring in the local study area: the number of existing producing wells within Fresno (11,550 existing wells), Monterey (3,596 existing wells), and San Benito Counties (388 existing wells) as shown in Table 3.17-2. Furthermore, any adverse environmental effects may be offset as production is reduced within existing fields. Because the 2015 RFD Scenario only includes the development of up to 37 wells, the conversion of this land to oil and gas

lease areas (assumed not open to public use) is not considered to be borne at a disproportionately higher level by these communities when considering the overall amount of land currently developed with oil and gas facilities and the amount of BLM public lands available to these sensitive communities. As discussed above in Section 4.17.2 under existing mitigation strategies, future site-specific environmental analyses by the BLM would be conducted to determine if any specific groups are affected and represent a disadvantaged community from an environmental justice standpoint for new leases occurring under Alternative A.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A Subalternative 1, the 14 non-NSO leases subject to the settlement agreement would be issued. The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). It is unknown how many wells may be developed within these leases. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, social and environmental effects from development of these leases are the same as those described in Section 4.17.2. Alternative A Subalternative 1 would not change the current management goals, objectives, and direction of the lease areas as specified in the 2007 HFO RMP. The existing BLM mitigation strategies discussed above in Section 4.17.2 would apply to any oil and gas developments and activities within these leases.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.17.4 Impacts of Alternative B

Relative to Alternative A, Alternative B would include only up to 32 wells drilled under the 2015 RFD Scenario. However, Alternative B only includes approximately 39,000 acres of Federal mineral estate open to oil and gas leasing with CSU stipulations. Open lease areas are restricted to Federal mineral estate within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR. This alternative would designate the least acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives.

When considering the proposed locations of Federal mineral estate lands open to oil and gas leasing under Alternative B on Figure 2-2, all designated areas are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Sections 4.17.1 and 4.17.2, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the impacts described in Section 4.17.2 describe those expected under Alternative B. As described in Section 4.17.2, a number of existing BLM and California permit procedures, environmental analyses requirements, BMPs, and other processes are currently in place or being planned to directly and indirectly mitigate the adverse effects of oil and gas development under Alternative B.

As described programmatically in Section 4.17.2, split estate leases have the potential to result in direct and indirect adverse (and beneficial) economic effects on landowners and local governments. By issuing a split estate lease, the development of oil and gas activities within the leased area can preclude existing or planned land uses and result in potential effects to the economic/social goals and direction sought by the local jurisdiction for the area. This issue was raised during the Social and Economic Workshop held on February 4, 2015 (BLM, 2015).

Under Alternative B, split estate leases are possible under the 2015 RFD Scenario, but limited to lands open to leasing within a 0.5-mile buffer around existing oil and gas fields as defined by the California DOGGR. Land within existing oil and gas fields are not expected to require split estate leases. Further-

more, lands within a 0.5-mile buffer around existing oil and gas fields would reduce potential impacts from any split estate leases conflicting with local jurisdiction land use planning or economic goals related to other uses of these lands. While the number of wells developed under the 2015 RFD scenario are considered negligible and would be limited to lands within oil and gas fields and 0.5-mile buffer areas currently defined by DOGGR, future split estate leases occurring under the 2015 RFD Scenario under Alternative B may result in minor adverse social and economic impacts to affected local jurisdictions. Mitigation Measure SE-1 is proposed to ensure the enhancement of outreach and coordination efforts with surface owners, vested parties, and local jurisdictions throughout the split estate lease process to reduce adverse social and economic impacts from split estate leases under Alternative B. While these impacts could also occur under Alternative A (No Action), Alternative B allows for an amendment to the RMP and therefore mitigation is proposed.

It should be noted that Alternative B includes more designated open lease area within San Benito and Fresno Counties, resulting in less potential for social and economic effects to occur within Monterey County as compared to Alternative A. Furthermore, Alternative B may provide the greatest benefit to non-market values throughout the CCFO Planning Area compared to all other alternatives by including the most areas closed to oil and gas leasing. However, this determination is contingent on those areas closed for oil and gas leasing not being developed with allowable uses that may diminish important resources such as recreation use and visual quality.

Mitigation

SE-1 **Enhance Surface Owner and Local Jurisdiction Outreach During Split Estate Lease Processing.** In addition to existing BLM plans, procedures, and recommendations related to implementation of fluid mineral leasing and land use planning, including the Instruction Memorandum (IM) providing guidance and procedures for implementation of fluid mineral leasing and land use planning recommendations within the Split Estate Report to Congress dated December 2006, BLM CCFO staff shall take the following actions to further enhance public outreach and agency coordination during preparation and finalization of each issued split estate lease:

- The CCFO shall initiate outreach efforts (e.g., mailed notices, in-person meetings, site visits) to split-estate surface owners and all vested parties to ensure their fullest involvement in the decision-making process for all split estate leases.
- The CCFO will meet and/or contact local government officials for each new split estate lease application to seek ways of ensuring split estate leases are consistent with the land use planning and community goals of the affected jurisdiction. CCFO staff will maintain a consistent rapport (e.g., through regular coordination and update notifications) with local officials regarding the status of the split estate lease until the lease is issued.

Leases Subject to Settlement Agreement

Under Alternative B, a portion of the area of 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.7.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, 22 percent would be open with CSU stipulations and 78 percent would be closed. It is unknown how many wells may be developed within the areas open for leasing. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, social and environmental effects from development of these leases are described in Section 3.17.2. Existing stipulations and mitigation strategies (as identified earlier) would be used to avoid and minimize impacts.

4.17.5 Impacts of Alternative C

Under Alternative C, approximately 368,800 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 29,800 would be open with NSO. The designated open lease areas would include Federal mineral estate within high oil and gas occurrence potential areas or within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR. The alternative would designate a moderate acreage of Federal mineral estate as available for oil and gas leasing compared with the other alternatives (i.e., less than Alternatives A and E, more than Alternatives B and D). It should be noted that Alternative C distributes designated open lease area similar to Alternative A within Monterey, San Benito, and Fresno Counties. However, a significant portion of the proposed acreage is open with restrictions.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative C on Figure 2-3, the majority of designated lands are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Sections 4.17.1 and 4.17.2, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the impacts described in Section 4.17.2 describe those expected under Alternative C.

As described in Section 4.17.2, a number of existing BLM and California permit procedures, environmental analyses requirements, BMPs, and other processes are currently in place or being planned to directly and indirectly mitigate the adverse effects of oil and gas development under Alternative C.

Under Alternative C, split estate leases under the 2015 RFD Scenario could occur within high oil and gas occurrence potential areas open to leasing. Lands with moderate, low and no oil and gas occurrence potential areas would be closed. Compared to Alternative B, the significant increase in land acreage open for leasing directly increases the potential for split estate leases to occur and potentially result in adverse effects. Based on concerns raised during the Social and Economic Workshop held on February 4, 2015, future split estate leases occurring under the 2015 RFD Scenario under Alternative C may result in minor adverse social and economic impacts to affected local jurisdictions (as described programmatically in Section 4.17.2 and similar to that described earlier for Alternative B). Mitigation Measure SE-1 is proposed to further enhance the outreach and coordination efforts with surface owners, vested parties, and local jurisdictions throughout the split estate lease process to reduce adverse social and economic impacts from split estate leases under Alternative C.

Mitigation

SE-1 Enhance Surface Owner and Local Jurisdiction Outreach During Split Estate Lease Processing.

Leases Subject to Settlement Agreement

Under Alternative C, the 14 non-NSO leases would be implemented in BLM-managed areas that are open to oil and gas leasing with CSU stipulations. The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). It is unknown how many wells may be developed within these leases. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, social and environmental effects from development of these leases are described in Section 3.17.2. The existing and proposed mitigation strategies discussed above would apply to any oil and gas developments and activities within these leases.

4.17.6 Impacts of Alternative D

Under Alternative D, approximately 121,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 16,400 acres would be open with NSO. Open lease areas are restricted to Federal mineral estate underlying BLM surface estate. All BLM split estate lands and the Ciervo Panoche Natural Area would be closed to leasing.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative D on Figure 2-4, the majority of designated areas are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Sections 4.17.1 and 4.17.2, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the impacts described in Section 4.17.2 describe those expected under Alternative D.

As described in Section 4.17.2, a number of existing BLM and California permit procedures, environmental analyses requirements, BMPs, and other processes are currently in place or being planned to directly and indirectly mitigate the adverse effects of oil and gas development under Alternative D. Based on concerns raised during the Social and Economic Workshop held on February 4, 2015, no minor adverse social and economic impacts would occur on split estate leases to affected local jurisdictions (as described programmatically in Section 4.17.2 and identical to that described earlier for Alternative B). As shown in Table 2-3, all split estate lands would be closed to oil and gas leases under Alternative D. While the inclusion of Mitigation Measure SE-1 under Alternatives B, C, and E is proposed to reduce potential adverse socioeconomic effects from split estate leases, closing split estate lands under Alternative D is considered to reduce potential impacts in comparison to the other alternatives evaluated.

It should be noted that Alternative D would designate the second smallest acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives. Therefore, Alternative D may provide the second greatest benefit to non-market values throughout the CCFO Planning Area compared to all other alternatives by including a significant amount of area closed to oil and gas leasing. However, this determination is contingent on those areas closed for oil and gas leasing not being developed with allowable uses that may diminish recreation use and visual quality.

Leases Subject to Settlement Agreement

Under Alternative D, a portion of the area of the 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.9.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. One lease would be entirely open; one would be entirely closed. Most leases would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, approximately 25 percent would be open with CSU stipulations and 75 percent would be closed. It is unknown how many wells may be developed within the areas open for leasing. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, social and environmental effects from development of these leases are described in Section 3.17.2. Existing stipulations and mitigation strategies (as identified earlier) would be used to avoid and minimize impacts.

4.17.7 Impacts of Alternative E

Under Alternative E, approximately 487,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 206,400 acres would be open with NSO. The designated open lease areas would include Federal mineral estate outside of a California DWR Bulletin 118, Groundwater Basin or Sub-basin. The alternative would designate the second largest acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative E on Figure 2-5, the majority of designated lands are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Sections 4.17.1 and 4.17.2, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the impacts described in Section 4.17.2 describe those expected under Alternative E. When compared to all other alternatives, Alternative E would be similar in potential for social and economic effects with the exception of Alternatives B and D, which have the greatest proposed acreage closed to oil and gas leases and may increase non-market value benefits.

As described in Section 4.17.2, a number of existing BLM and California permit procedures, environmental analyses requirements, BMPs, and other processes are currently in place or being planned to directly and indirectly mitigate the adverse effects of oil and gas development under Alternative E.

Under Alternative E, split estate leases under the 2015 RFD Scenario could occur within Federal mineral estate lands outside of California Department of Water Resources (DWR) Bulletin 118 groundwater basins & sub-basins open to leasing. Compared to Alternative B, the significant increase in land acreage open for leasing directly increases the potential for split estate leases to occur and potentially result in adverse effects. Compared to Alternative C, the potential for split estate leases to result in adverse effects would be greater for Alternative E as they could occur in areas not designated with high oil and gas occurrence potential (acknowledging that new wells would likely not be developed outside these areas). Based on concerns raised during the Social and Economic Workshop held on February 4, 2015, future split estate leases occurring under the 2015 RFD Scenario under Alternative E may result in minor adverse social and economic impacts to affected local jurisdictions (as described programmatically in Section 4.17.2 and similar to that described earlier for Alternative B). Mitigation Measure SE-1 is proposed to further enhance the outreach and coordination efforts with surface owners, vested parties, and local jurisdictions throughout the split estate lease process to reduce adverse social and economic impacts from split estate leases under Alternative E.

Mitigation

SE-1 Enhance Surface Owner and Local Jurisdiction Outreach During Split Estate Lease Processing.

Leases Subject to Settlement Agreement

Under Alternative E, a portion of the 14 non-NSO leases would be open to leasing. Of the total lease area of approximately 17,600 acres, approximately 57 percent would be open with CSU stipulations, 41 percent would be open with NSO, and 2 percent would be closed. Alternative E would incorporate new restrictions in the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP. The existing and proposed mitigation strategies discussed above would also apply to any oil and gas developments and activities within these leases. The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). It is unknown how many wells may be developed within these leases. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, social and environmental effects from development of these leases are described in Section 3.17.2. Existing stipulations and mitigation strategies (as identified earlier) would be used to avoid and minimize impacts.

4.18 Transportation and Access

This section focuses on BLM roads and trails that provide access to, and through, BLM public lands. There is considerable overlap of travel management and all BLM uses on public lands. For example, many users of public lands are there for recreation. For visitors, a route system may serve as either a route to a destination or as the recreation location itself. For destination recreation, vehicle routes are the means to get to a starting point to engage in the activity, such as a parking area or trailhead. The route itself also can serve as the focus of the activity (e.g., pleasure driving, four-wheel vehicle driving, motorcycling, all-terrain vehicle (ATV) riding, biking, horseback riding, hiking, snowmobiling, and cross-country skiing. To reduce the duplication of narrative between travel management and the other sections of this RMPA/EIS, this section addresses only public travel and access concerns in relation to the development of the 2015 Reasonably Foreseeable Development (RFD) Scenario for oil and gas development on Federal mineral estate within the Central Coast Field Office (CCFO) Planning Area (Planning Area).

4.18.1 Introduction

Approach to Impact Assessment

This impact analysis evaluates the proposed RMPA alternatives for potential conflicts with BLM travel management goals or objectives. As discussed in Section 3.18, BLM's Comprehensive Travel and Transportation Management (CTTM) program and Executive Orders 11644 and 11989 establish core guidelines and management strategies that BLM utilizes for travel management. A discussion of the regional transportation network, including highways, major roads, County roads, rail, and aviation is not included. The discussion of hazardous materials transport is in Sections 3.4 and 4.4 (Hazardous Materials and Public Safety).

The management goals for Transportation and Access from the 2007 HFO RMP are restated here:

- The goals for transportation and access are to (1) maintain roads for administrative purposes; (2) support local counties and the State of California in providing a network of roads for movement of people, goods, and services across public lands; and (3) manage motorized access use to protect resource values, promote public safety, provide responsible motorized access use opportunities where appropriate, and minimize conflicts among various user groups.

The Area-wide Transportation and Access Management Actions from the 2007 HFO RMP include:

- **TRANS-COM1.** Public vehicle use on all BLM lands would be limited to designated routes, except as noted. As outlined in the Interim Management Policy (IMP) for Lands Under Wilderness Review and wilderness legislation, WSAs and Wilderness Areas would be closed to vehicle use, except on designated pre-existing vehicle ways.
- **TRANS-COM2.** Complete route maintenance and improvement work in accordance with implementation standards and references from the following sources:
  - BLM Manuals 9113, H-9113-2, and 9114
  - Federal Highway Administration (FHWA) Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects Standards
  - U.S. Forest Service Trails Handbook 2309.18 (Section 2.32 (a)(b)(c))
- **TRANS-C1.** Reclaim redundant road systems or roads that no longer serve their intended purpose to protect sensitive resources, reduce sediment transport, and control erosion.
- **TRANS-C2.** Implement BMPs to reduce off-site water quality impacts from roads and trails that no longer serve their original purpose or exceed State soil loss standards.

- **TRANS-C3.** Temporarily close roads to vehicle use during periods of extreme wet weather in areas where sustained vehicle use may compromise the integrity of the road surface.
- **TRANS-C4.** Mitigate or relocate travel routes that traverse riparian areas or cross critical habitat, and occupied or potential habitat, of special status species.

BLM Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) are listed in Appendix D of this EIS. They are BLM methods, measures, or practices selected on the basis of site-specific conditions to provide the most effective, environmentally sound, and economically feasible means of managing an activity and mitigating its impacts. Several BMPs and SOPs listed in Appendix D, Section 1.6 (Oil and Gas Standard Operating Procedures, Implementation Guidelines and Conditions of Approval) would apply to reducing potential impacts to BLM transportation facilities and land accessibility from oil and gas leases.

Assumptions

The following assumptions were used to complete the analysis for transportation and access impacts from the proposed Resource Management Plan Amendment (RMPA):

- Future environmental analyses would be conducted, as appropriate, for project- and site-specific actions proposed in the CCFO administrative boundary. Applications for Permit to Drill would address potential loss of access or disruption to existing transportation routes from oil and gas development on BLM affected transportation facilities.
- As described in Section 2.5.2, the same level of oil and gas development under the 2015 RFD Scenario would apply to Alternatives A, C, D, and E (i.e., 37 exploratory and development wells on 206 acres of disturbance). Alternative B would have 32 development wells and up to 179 acres of disturbance.
- All surface-disturbing activities related to the 2015 RFD Scenario would most likely occur on BLM-administered mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO but may potentially occur anywhere that is open to oil and gas leasing.
- New oil and gas well locations developed under the 2015 RFD Scenario would most likely be within or near established producing oil and gas fields but may potentially occur anywhere that is open to oil and gas leasing.

4.18.2 Impacts Common to All Alternatives

Development of New Roads

Under the 2015 RFD Scenario, up to 37 exploratory and development wells would be developed on a maximum of 206 acres of disturbance. This disturbance area includes any new access roads needed to access the new well sites. This amount of oil and gas development would require only short (approximately 0.25 to 0.5 miles long) segments of new roads, which would likely be closed to the public and for oil and gas worker use only. New access roads would most likely be located within, or adjacent to, existing oil and gas fields.

In general, the heavy equipment and materials needed for well development and stimulations do not pose unique transportation challenges. New access roads or improvements may be necessary if new well sites are not served by existing roadways, or access routes are not built to support heavy truck traffic up to the Federal limit of 80,000 pounds gross vehicle weight for the National Network (Title 23 Code of Federal Regulations [CFR] Part 658). In addition, a small number of one-time oversized and overweight shipments may be required for larger earthmoving equipment used in site preparation.

The construction of new roads is not considered to have secondary maintenance and system management impacts, as the well developer would likely maintain these roads to ensure site access. Changes in the level and types of traffic could result in secondary impacts on the governmental entities that manage the road system if added sign maintenance or patrol becomes warranted in order to institute these restrictions.

Alter the Availability or Accessibility of BLM Routes of Travel

Under all alternatives, the BLM's management of travel routes and access would remain identical to that under the existing 2007 HFO RMP. Some level of use restriction to existing open travel routes and access points on BLM lands may be necessary to varying degrees under the various alternatives with the 2015 RFD Scenario. This may include temporary or permanent closure of roads due to the presence of new wells, or due to a new private access roadway restricting public traffic flow or access requiring a change in travel route designations (i.e., open, limited, or closed). Site closure is typically necessary for well development, which limits travel to and from off-site locations. Depending on the location, this disruption may create minor or negligible adverse effects, as some users may prefer to use existing BLM open routes year-round. Furthermore, the development of wells and facilities under the 2015 RFD Scenario may alter the amount and distribution of oil and gas-related traffic on existing roads.

User conflicts could potentially occur in areas where there is public non-motorized and motorized use within the same travel ways as oil and gas related traffic and uses. It is anticipated that motorized recreational vehicle traffic on roads and trails remaining open would increase incrementally over time, and may increase as a result of road closures redirecting traffic to open roadways.

It is possible that portions of new lease areas could be fenced or marked to prohibit public use. This could occur in areas currently used by the public for access to recreational opportunities or for travel on BLM-administered lands. While related to transportation and access, this type of potential impact is also considered a land use conflict, which is specifically discussed in Sections 4.14 (Special Management Areas) and 4.19 (Lands and Realty). Because most access in the CCFO Planning Area is dependent on motor vehicles, the location of travel routes and the potential loss of access to recreation assets must be considered with new oil and gas leasing activity. As identified in the assumptions presented in Section 4.18.1, this would occur during future environmental analyses for all lease applications and permits to drill. While other land uses are allowed within the areas proposed for open oil and gas leasing, these uses must be compatible with the resources and values that the land designation is intended to protect. Depending on the alternative, management actions may apply to protect lease areas for Recreation and Public Purposes (ENERG-COM3 in Alternatives A and D) or to minimize or eliminate conflict between oil and gas development and existing surface uses (CSU stipulations in each alternative except Alternative A). The analysis of land use issues is provided in Sections 4.14 (Special Management Areas) and 4.19 (Lands and Realty).

Traffic Generation

Activities under the 2015 RFD Scenario may increase traffic on nearby roads. The majority of trips generated would be temporary, occurring primarily during well development and any stimulation treatments. Once operational, each well would generate a negligible amount of daily vehicle trips. The primary impact of concern would be any performance degradation of roadways providing key access to the well sites. Because the location of future wells is unknown, a quantitative trip analysis is not feasible as the utilized roadways are unknown. However, the distance of well sites from major roads will to some extent determine the potential for traffic to change local circulation patterns or degrade local roads and cause congestion problems, especially from heavy-duty trucks. In general, commuting workers and equipment and materials deliveries to each well during development would cause a small increase in the existing volume of traffic on roadways and highways providing local and regional access. For a well stimulation treatment, the maximum trips generated per well stimulation project would be approximately 51 trips per day (DOC, 2015).

An important aspect when considering traffic volume increases over existing conditions is the life cycle of existing oil and gas extraction. As the availability of oil and gas resources decline, production decreases. Existing traffic volumes from current field activities, including well stimulations, also would decrease as compared to periods of higher oil and gas production. As most of the recoverable resource is removed, well stimulation is no longer effective in increasing flow to a level that would justify its continued use. Therefore, as new activities (and any new traffic volumes) that occur under the 2015 RFD Scenario are introduced, existing activities (and any existing traffic volumes) would be reduced as production declines and wells are decommissioned. Therefore, over the life of the 2015 RFD Scenario (15-20 years), no net traffic increases may occur from the development of up to 37 new wells.

Existing Mitigation Strategies

Existing BLM strategies in place as part of the existing RMP guide management of transportation and access facilities. These management actions would indirectly mitigate the adverse effects of oil and gas development and their effects on BLM transportation facilities. These requirements would apply to all future environmental analyses, wells, well stimulations, and other enhanced oil recovery techniques occurring under the 2015 RFD Scenario on BLM-administered mineral estate for all alternatives. As stated within the existing RMP, the primary management strategy is that public vehicle use on all BLM lands would be "limited" to designated routes, except as noted. BLM lands closed to vehicle use, except on designated pre-existing vehicle ways, are also discussed in Sections 4.14 (Special Management Areas) and 4.19 (Lands and Realty).

Existing BLM standards regarding road design, construction, and maintenance are described in BLM Manual 9113 (BLM, 1985). An access road siting and management plan should be prepared incorporating these standards, as appropriate. Generally, roads should be required to follow natural contours; be constructed in accordance with standards described in BLM Manual 9113; and be reclaimed to BLM standards. As described in BLM Manual 9113, BLM roads should be designed to appropriate standards no higher than necessary to accommodate their intended functions.

4.18.3 Impacts of Alternative A (No Action)

This alternative maintains the management direction of the 2007 HFO RMP. As described in Section 4.18.1, the same level of oil and gas development under the 2015 RFD Scenario would apply to the No Action Alternative (i.e., 37 wells and 206 acres of disturbance). Therefore, the level of traffic volumes from 2015 RFD Scenario activities would be the same for all alternatives, with common impacts described in Section 4.18.2.

Alternative A would designate the largest acreage of Federal mineral estate open to oil and gas leasing, which would provide the BLM with greater flexibility in identifying sites for locating ground disturbance activities. Utilizing a larger area available for the 206 acres of surface disturbance under the 2015 RFD Scenario may avoid the need for new access roads and potential conflicts regarding public transportation routes and access to BLM resources. Disruption to existing BLM transportation routes and access impacts associated with oil and gas development may be less severe under Alternative A when compared to the other alternatives. See Sections 4.14 (Special Management Areas) and 4.19 (Lands and Realty) for a discussion of land use issues.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A Subalternative 1, the 14 non-NSO leases subject to the settlement agreement would be issued. The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). It is unknown how many wells may be developed within these leases. As discussed in Section 3.18.4, the eight non-NSO leases in San Benito County are within 7 miles of the active Vallecitos oil and gas field boundary, as shown in Figure 2-1 (detailed view), and the six non-NSO leases

in Monterey County are located within 10 miles of the active San Ardo oil and gas field. Because these leases are located proximate to areas with existing oil and gas development, relatively minor lengths of new access roads would be needed, as described in the 2015 RFD Scenario. Vehicle trip volumes from these leases are expected to be minor and would occur under the 2015 RFD Scenario, as described in Section 4.18.2.

Alternative A Subalternative 1 would not change the current transportation management goals, objectives, and direction of the lease areas as specified in the 2007 HFO RMP. The existing BLM mitigation strategies discussed above in Section 4.18.2 and surface transportation management within the existing RMP would apply to oil and gas activities within these leases. As described in Section 4.19 (Lands and Realty), the implementation of these leases under Alternative A Subalternative 1 would not create a land use conflict. Therefore, all facilities (including new access roads) associated with these leases are not expected to adversely affect current BLM transportation routes or access management.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.18.4 Impacts of Alternative B

Relative to Alternative A, Alternative B would also have oil and gas development occurring under the 2015 RFD Scenario but only up to 32 wells. Alternative B includes approximately 39,000 acres of Federal mineral estate open to oil and gas leasing with CSU stipulations. Open lease areas are restricted to Federal mineral estate within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR. This alternative would designate the least acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative B on Figure 2-2, all designated areas are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Section 4.18.1, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the common impacts described in Section 4.18.2 describe those expected under Alternative B. It is likely that new leases and wells under Alternative B could utilize existing transportation routes already providing access to existing oil and gas extraction areas. However, the construction of any new access roads is included within the total disturbance area of 206 acres under the 2015 RFD Scenario.

As discussed in Section 4.18.2, the minor to negligible adverse effects of development of wells and other facilities under the 2015 RFD Scenario include potentially decreasing use of transportation routes and accessibility to surrounding lands. Depending on the location of a lease and well facility, existing BLM travel routes and access points may be altered. While well facilities may be configured to allow some public access through the lease area, it's possible new leases under the 2015 RFD Scenario result in minor adverse effects by establishing new restrictions on existing transportation routes and access points.

As described in Section 4.18.2, existing BLM management strategies are currently in place under the 2007 HFO RMP for transportation routes and access. In addition to these management strategies, Mitigation Measure TR-1 could be implemented to reduce the disruption of existing BLM transportation routes or access points as a result of oil and gas development under Alternative B. With the implementation of this measure, impacts on local transportation networks from the 2015 RFD Scenario under Alternative B would be negligible. Furthermore, any adverse effect may be offset somewhat should new access roads be available to the public as part of new oil and gas leases. New or improved access roads may provide valuable new backbone routes through BLM affected portions of the CCFO Planning Area.

Mitigation

TR-1 **Travel Routes and Access to Open Lands.** Existing roads should be used to the maximum extent possible, but only if in safe and environmentally sound locations and manners. If existing BLM travel routes or access points currently available for public use under the applicable RMP are disrupted temporarily or permanently by oil and gas leases, developers and/or lease holders shall be required to provide alternate replacement transportation routes and ensure continued public access to previously accessible public lands. All new transportation routes or access roads required as part of developing an oil and gas lease area shall be designed and constructed to all appropriate BLM standards.

Leases Subject to Settlement Agreement

Under Alternative B, a portion of the area of 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.7.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, 22 percent would be open with CSU stipulations and 78 percent would be closed. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

4.18.5 Impacts of Alternative C

Under Alternative C, approximately 368,800 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 29,800 acres would be open with NSO. The designated open lease areas would include Federal mineral estate within high oil and gas occurrence potential areas or within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR. The alternative would designate a moderate acreage of Federal mineral estate as available for oil and gas leasing compared with the other alternatives (i.e., less than Alternatives A and E, more than Alternatives B and D). It should be noted that Alternative C distributes designated open lease area similar to Alternative A within Monterey, San Benito, and Fresno Counties.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative C on Figure 2-3, the majority of designated lands are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Section 4.18.1, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the common impacts described in Section 4.18.2 describe those expected under Alternative B. When compared to Alternative A and B, the transportation and access impacts associated with Alternative C would be similar or identical programmatically.

Mitigation Measure TR-1 could be implemented to reduce the disruption of existing BLM transportation routes or access points within the CCFO Planning Area from oil and gas development under Alternative C. With the implementation of this measure, impacts on local transportation networks from the 2015 RFD Scenario under Alternative C would be negligible.

Mitigation

TR-1 **Travel Routes and Access to Open Lands.**

Leases Subject to Settlement Agreement

Under Alternative C, the 14 non-NSO leases would be implemented in BLM-managed areas that are open to oil and gas leasing with CSU stipulations. The nearest incorporated communities to these leases are Coalinga (Fresno County) and King City (Monterey County). It is unknown how many wells may be

developed within these leases. However, because these leases are located within the expected areas where the majority of oil and gas development would occur within BLM-administered mineral estate under the 2015 RFD Scenario, impacts to transportation and access from development of these leases are described in Section 4.18.2. The existing BLM transportation management actions and Mitigation Measure TR-1 could be implemented for oil and gas developments and activities within these leases under Alternative C if adopted by BLM.

4.18.6 Impacts of Alternative D

Under Alternative D, approximately 121,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 16,400 acres would be open with NSO. Open lease areas are restricted to Federal mineral estate underlying BLM surface estate. All BLM split estate lands and the Ciervo Panoche Natural Area would be closed to leasing.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative D on Figure 2-4, the majority of designated areas are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Section 4.18.1, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to occur under the 2015 RFD Scenario. Therefore, the common impacts described in Section 4.18.2 describe those expected under Alternative B. When compared to Alternatives A through C, the transportation and access impacts associated with Alternative D would be similar or identical programmatically.

Mitigation Measure TR-1 could be implemented to reduce the disruption of existing BLM transportation routes or access points within the CCFO Planning Area from oil and gas development under Alternative D. With the implementation of this measure, impacts on local transportation networks from the 2015 RFD Scenario under Alternative D would be negligible.

Mitigation

TR-1 Travel Routes and Access to Open Lands.

Leases Subject to Settlement Agreement

Under Alternative D, a portion of the area of 14 non-NSO leases, as identified in Case No. 11-06174 and Case No. 13-1749, would be available for oil and gas development (Section 2.9.2) and subject to resulting impacts as discussed above. The remaining areas of the leases would be closed to oil and gas development. Depending on location, some entire leases would be open for development, others would be all or nearly all closed. Many would have a mixture of open and closed areas. Of the total lease area of approximately 17,600 acres, approximately 25 percent would be open with CSU stipulations and 75 percent would be closed. CSU stipulations would be used to avoid and minimize impacts to certain sensitive biological resources.

4.18.7 Impacts of Alternative E

Under Alternative E, approximately 487,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 206,400 acres would be open with NSO. The designated open lease areas would include Federal mineral estate outside of a California DWR Bulletin 118, Groundwater Basin or Sub-basin. The alternative would designate the second largest acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives.

When considering the proposed locations of Federal mineral estate open to oil and gas leasing under Alternative E on Figure 2-5, the majority of designated lands are located within the southern portion of the CCFO Planning Area in Monterey, San Benito, and Fresno County. As described in Section 4.18.1, these are the areas where most oil and gas development on BLM-administered mineral estate is expected to

occur under the 2015 RFD Scenario. Therefore, the common impacts described in Section 4.18.2 describe those expected under Alternative B. When compared to Alternatives A through D, the transportation and access impacts associated with Alternative E would be similar or identical programmatically.

Mitigation Measure TR-1 could be implemented to reduce disruption of existing BLM transportation routes or access points within the CCFO Planning Area from oil and gas development under Alternative E. With the implementation of this measure, impacts on local transportation networks from the 2015 RFD Scenario under Alternative E would be negligible.

Mitigation

TR-1 Travel Routes and Access to Open Lands.

Leases Subject to Settlement Agreement

Under Alternative E, a portion of the 14 non-NSO leases would be open to leasing. Of the total lease area of approximately 17,600 acres, approximately 57 percent would be open with CSU stipulations, 41 percent would be open with NSO, and 2 percent would be closed. Alternative E would incorporate new restrictions in the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP. The existing BLM transportation management actions and Mitigation Measure TR-1 could be implemented for oil and gas developments and activities within these leases under Alternative E if adopted by BLM.

4.19 Lands and Realty

The BLM's resource management program for Lands and Realty (i.e., Lands and Realty program) includes land tenure adjustments (e.g., disposals and acquisitions), land use authorizations (i.e., leases, permits, right-of-way grants), and withdrawals in order to facilitate management of public lands and resources in the planning area. As discussed in Section 3.19 (Lands and Realty), this RMPA/EIS analyzes the effects of land use authorizations pertaining to oil and gas leasing that would apply to each of the Draft RMPA alternatives (i.e., areas designated open or closed to leasing and applicable stipulations).

4.19.1 Introduction

Approach to Impact Assessment

The goal for lands and realty management presented in the 2007 HFO RMP, including withdrawals, is to provide lands, interests in land, and authorizations for public and private uses while maintaining and improving resource values and public land administration. Management of land tenure adjustments and withdrawals would not be affected by the Draft RMPA alternatives, and would remain consistent with the management actions established in the 2007 HFO RMP.

For this analysis, the area considered for land use authorizations consists of the BLM-administered surface land and split estate land where BLM manages the Federal mineral estate within the CCFO administrative boundary. The following types of Lands and Realty impacts may occur:

- Direct impacts are those that either reduce or enlarge the area upon which land use authorizations can occur (e.g., identification of exclusion areas reduces the locations in which use authorizations may be issued). As such, the number of acres where lands and realty actions are potentially restricted is used to indicate the impact of management actions and decisions.
- Indirect impacts would potentially occur from restrictions that limit the type of development allowed by a specific use authorization (e.g., requirements to comply with BMPs and SOPs). BMPs could be applied as Conditions of Approval (COA) at the time of permitting of oil and gas drilling or related operations or other activities.

Assumptions

The analysis is based on the following assumptions:

- The following areas identified in the 2007 HFO RMP would not change: land tenure adjustments (i.e., retention and disposal areas), areas identified for withdrawal, and avoidance and exclusion areas for non-oil and gas projects.
- Oil and gas lease stipulations and COAs that limit land use authorizations (e.g., ROWs, leases, and permits) to support oil and gas development would not preclude the BLM from granting land use authorizations for other purposes (not related to oil and gas).
- Future environmental analyses would be conducted, as appropriate, for project- and site-specific actions proposed in the CCFO Planning Area. Applications for Permit to Drill would address potential conflicts between oil and gas development and other resources within the site specific area.
- As described in Section 2.5.2, the same level of oil and gas development under the 2015 RFD Scenario would apply to each alternative (i.e., 37 exploratory and development wells on 206 acres of disturbance).
- All surface-disturbing activities related to the 2015 RFD Scenario would most likely occur on BLM-administered mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas potential (shown in Figure 5-1) for the CCFO Planning Area but may potentially occur anywhere that is open to oil and gas leasing. New oil and gas well locations would most likely be within or near established producing oil and gas fields.

4.19.2 Impacts Common to All Alternatives

This section describes typical impacts to BLM lands and realty specifically associated with various oil and gas facilities and infrastructure that would be permitted under the Draft RMPA alternatives. For each alternative, the development of oil and gas facilities would establish a long-term industrial use at future lease sites, which may prevent the authorization of non-energy land uses in the area (e.g., recreation, agriculture).

Impacts from Oil and Gas Development

As discussed in the 2015 RFD Scenario, it is unlikely that more than 37 exploratory and development wells would be drilled on Federal oil and gas leases. The development of new wells within the CCFO Planning Area would create long-term impacts during well construction, operation, and decommissioning. Construction and decommissioning activities could disrupt existing land uses, prevent access to some locations, or conflict with BLM policies or regulations pertaining to non-energy land uses, leading to impacts that could range from minor to major. Operation and maintenance activities on BLM-administered mineral estate would require long-term land use that could convert BLM lands to permanent industrial use. Other long-term impacts may include closing public areas and removing BLM lands from non-energy land uses such as recreation. Long-term changes to established land uses would create a permanent, major impact. Many of these conflicts with existing land uses and surface land owners were identified as issues of concern during the BLM's Social and Economic Workshop held on February 4, 2015 (see Appendix F).

Potential oil and gas activities within the CCFO Planning Area would include seismic operations (i.e., geophysical exploration), exploration drilling, and field development and production. The total estimated surface disturbance for the 37 exploratory and development wells would be up to 206 acres. This estimate includes all anticipated forms of ground disturbance such as the construction of well pads, roads, onsite facilities, and pipelines.

Well stimulation technologies (e.g., hydraulic fracturing, acid matrix stimulation, acid fracturing) and enhanced oil recovery techniques (e.g., cyclic steam, steam flood, water flood) may be used on any or all of the 37 wells. While the equipment and methods vary for each technology, the well stimulation operations would occur entirely within the well pad and no additional ground disturbance would be anticipated beyond what has already been considered in the 206-acre estimate.

Impacts from Management Actions

As discussed in Section 3.19 (Lands and Realty), the area considered for land use authorizations includes approximately 793,000 acres of Federal mineral estate within the CCFO Planning Area. The total acreage that would be open for leasing (with or without stipulations) under the Draft RMPA/EIS alternatives ranges from 39,000 acres (Alternative B) to 725,500 acres (Alternative A). Sections 4.19.3 through 4.19.7 describe the range in total acreage open for leasing under each alternative, while a minimum of 67,500 acres would be closed to leasing under all alternatives. Areas closed to leasing limit the potential for oil and gas developments to preclude other land use authorizations not related to oil and gas in those areas. Current management decisions under the 2007 HFO RMP would continue to determine non-oil and gas land use authorizations within the CCFO Decision Area.

Best Management Practices

The BLM has developed requirements for conducting environmentally responsible oil and gas operations on BLM-administered surface land and split estate land. Appendix D (Best Management Practices) includes a compilation of existing BLM policies, guidelines, and practices designed to prevent unnecessary or undue degradation of public land resources. The BLM has also identified specific oil and gas development requirements to minimize environmental impacts, which are separately published in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as

The Gold Book). For each Application for Permit to Drill (APD), the BLM would select and apply BMPs based on site-specific conditions to meet a variety of resource objectives for specific management actions.

4.19.3 Impacts of Alternative A (No Action)

Impacts from Oil and Gas Development

Under Alternative A, approximately 683,800 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 41,700 acres would be open to oil and gas leasing with No Surface Occupancy (NSO). This alternative maintains the management direction of the 2007 HFO RMP under which all Federal mineral estate would be available for oil and gas leasing with the exception specific exclusion areas (i.e., Wilderness Areas, Wilderness Study Areas, Clear Creek Serpentine Area of Critical Environmental Concern, and Fort Ord National Monument).

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 206 acres of disturbance). Alternative A would designate the largest acreage of Federal mineral estate open to leasing, which would provide the BLM with greater flexibility in identifying sites for locating ground disturbance activities than the other RMPA alternatives. However, under each of the alternatives new oil and gas well locations would most likely be within or near established producing oil and gas fields. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative A given the expected proximity of new oil and gas development to existing production areas.

Impacts from Management Actions

New oil and gas related land use authorizations would be considered on a case-by-case basis, but denied in exclusion areas. Under Alternative A, approximately 41,700 acres would be subject to NSO stipulations, which are identified in Section 2.10 as the following:

- **ENERG-COM3.** Require No Surface Occupancy stipulations on all Recreation and Public Purposes (R&PP) lease areas.
- **ENERG-C1.** Oil and gas leases in Areas of Critical Environmental Concern (ACECs) would stipulate No Surface Occupancy in special status species habitat (BLM, 2007; Appendix D)

Areas subject to stipulations could restrict the placement or routing of oil and gas infrastructure (i.e., roads or pipelines), which may limit access or delay energy projects. However, the above stipulations would effectively avoid conflicts between oil and gas development and existing BLM land management and land use authorizations in ACECs and R&PP leases. Endangered species stipulations would apply to all areas open to oil and gas leasing. With application of these stipulations, impacts to land use authorizations would be negligible.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative A.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, the 14 non-NSO leases subject to the settlement agreement would be issued. Alternative A would not change the current management goals, objectives, and direction of the lease areas as specified in the 2007 HFO RMP. Consequently, this alternative would not create a conflict with existing land-use authorizations. Endangered species stipulations would apply to each of the 14 leases, while new NSO stipulations would not apply. Given the application of the 2007 HFO RMP as well as endangered species stipulations, the 14 leases would have a negligible impact on land use authorizations under Alternative A.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.19.4 Impacts of Alternative B

Impacts from Oil and Gas Development

Under Alternative B, 39,000 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations. Open lease areas are restricted to Federal mineral estate within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR.

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 206 acres of disturbance). Alternative B would designate the least acreage of Federal mineral estate open to leasing among all alternatives, which would restrict the BLM's options for locating ground disturbance activities. However, under each of the alternatives new oil and gas well locations would likely be within or near established producing oil and gas fields. Surface disturbance impacts resulting from Alternative B would be long-term, but would be moderate given the expected proximity of new oil and gas development to existing production areas.

Impacts from Management Actions

For each alternative, new oil and gas related land use authorizations would be considered on a case-by-case basis but denied in exclusion areas. Unlike Alternative A, Alternative B would require CSU stipulations on all Federal mineral estate open to oil and gas leasing, which are identified in Section 2.10 as the following:

- **ENERG-A2.** Public lands within oil and gas fields plus a 0.5-mile buffer defined by DOGGR would be open to mineral leasing; all other public lands would be closed to mineral leasing.
- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing.

Areas subject to stipulations could restrict the placement or routing of oil and gas infrastructure (i.e., roads or pipelines), which may limit access or delay energy projects. The above stipulations would severely restrict oil and gas extraction in areas of "high oil and gas occurrence potential," and the BLM would likely grant non-energy land use authorizations in areas closed to oil and gas leasing. However, the BLM would apply the above stipulations to all land management decisions under Alternative B, thereby avoiding conflicts between existing authorizations and future land uses. Impacts from management actions would be negligible.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative B.

Leases Subject to Settlement Agreement

Under Alternative B, approximately 78 percent of the 14 non-NSO leases would be closed to leasing. Unlike Alternative A, Alternative B would change the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP. Non-energy land use authorizations that may be granted in this area could conflict with existing oil and gas activities, which may result in moderate impacts under Alternative B. Such impacts would be greater than the negligible impacts associated with Alternatives A and C.

4.19.5 Impacts of Alternative C

Impacts from Oil and Gas Development

Under Alternative C, approximately 368,800 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 29,800 would be open with NSO. The designated open lease areas would include Federal mineral estate within high oil and gas occurrence potential areas or within the boundaries of oil and gas fields plus a 0.5-mile buffer as defined by DOGGR, with the exception of core population areas of the kangaroo rat in the vicinity of the Panoche, Griswold, Tumey, and Ciervo Hills which are closed to leasing.

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 206 acres of disturbance). Alternative C would designate more acreage of Federal mineral estate open to leasing than Alternatives B and D, which would provide the BLM with greater flexibility in identifying sites for locating ground disturbance activities than under those alternatives. However, under each of the alternatives new oil and gas well locations would most likely be within or near established producing oil and gas fields. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative C given the expected proximity of new oil and gas development to existing production areas.

Impacts from Management Actions

For each alternative, new oil and gas related land use authorizations would be considered on a case-by-case basis but denied in exclusion areas. Unlike Alternative A but similar to Alternative B, Alternative C would require CSU stipulations on all Federal mineral estate open to oil and gas leasing. Under Alternative C, approximately 29,800 acres would be subject to NSO stipulations, which are identified in Section 2.10 as the following:

- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing.
- **ENERG-A4.** Public lands within areas of high oil and gas potential or public lands within oil and gas fields plus a 0.5-mile buffer defined by DOGGR would be open to mineral leasing, with the exception of core population areas of the kangaroo rat in the vicinity of Panoche, Griswold, Tumey, and Ciervo Hills which are closed to leasing. Public lands within areas of moderate, low, and no potential would be closed to mineral leasing.
- **ENERG-A5.** Require NSO stipulations for public lands open to leasing which include: (1) threatened and endangered species critical habitat; (2) BLM developed recreation and administrative sites; and (3) special status split estate lands (e.g., state parks, county parks, conservation easements, land trusts, and scenic designations).

Areas subject to stipulations could restrict the placement or routing of oil and gas infrastructure (i.e., roads or pipelines), which may limit access or delay energy projects. The above stipulations would restrict oil and gas extraction in areas of "high oil and gas occurrence potential," and the BLM would likely grant non-energy land use authorizations in areas closed to leasing. However, the above stipulations would also avoid conflicts between oil and gas development and existing BLM land management and land use authorizations applicable to developed recreation sites and other areas of special designation (i.e., state parks, county parks, conservation easements, land trusts, scenic designations). With application of these stipulations, impacts to land use authorizations would be negligible.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative C.

Leases Subject to Settlement Agreement

Under Alternative C, the 14 non-NSO leases would be in BLM-managed areas that are open to leasing with CSU stipulations. Alternative C would not change the current management goals, objectives, and direction of the 14 leases, and no NSO stipulations would apply to the lease areas. Given the application of the 2007 HFO RMP, the 14 leases would have a negligible impact on land use authorizations under Alternative C.

4.19.6 Impacts of Alternative D

Under Alternative D, approximately 121,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 16,400 acres would be open to oil and gas leasing with NSO. Open lease areas are restricted to Federal mineral estate underlying BLM surface estate. All BLM split estate lands and the Ciervo Panoche Natural Area would be closed to leasing. This alternative would designate the second smallest acreage of Federal mineral estate available for oil and gas leasing among all of the alternatives.

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 206 acres of disturbance). Alternative D would designate less acreage of Federal mineral estate open to leasing than Alternatives A, C, and E. The smaller acreage available for leasing would restrict the BLM's options for locating ground disturbance activities. However, under each of the alternatives new oil and gas well locations would most likely be within or near established producing oil and gas fields. Surface disturbance impacts under Alternative D would be long-term, but would be moderate given the expected proximity of new oil and gas development to existing production areas.

Impacts from Management Actions

For each alternative, new oil and gas related land use authorizations would be considered on a case-by-case basis but denied in exclusion areas. Unlike Alternative A but similar to Alternatives B and C, Alternative D would require CSU stipulations on all Federal mineral estate open to oil and gas leasing. Under Alternative D, approximately 16,400 acres would be subject to NSO stipulations, which are identified in Section 2.10 as the following:

- **ENERG-COM3.** Require No Surface Occupancy stipulations on all R&PP lease areas.
- **ENERG-C1.** Oil and gas leases in ACECs would stipulate No Surface Occupancy in special status species habitat (BLM, 2007; Appendix D).
- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing.
- **ENERG-A6.** Federal mineral estate underlying BLM surface estate would be open to mineral leasing. Split estate public lands would be closed to mineral leasing.

Areas subject to stipulations could restrict the placement or routing of oil and gas infrastructure (i.e., roads or pipelines), which may limit access or delay energy projects. The above stipulations would restrict oil and gas extraction in areas of "high oil and gas occurrence potential." However, the application of NSO stipulations over a larger management area under Alternative D would allow greater flexibility in the BLM's management of oil and gas resources compared to the restrictions that apply to Alternative B's smaller management area. Given that the BLM would apply the above stipulations to all land management decisions under Alternative D, impacts to land use authorizations would be negligible.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative D.

Leases Subject to Settlement Agreement

Under Alternative D, approximately 75 percent of the 14 non-NSO leases would be closed to leasing. Unlike Alternative A, Alternative D would change the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP. Non-energy land use authorizations that may be granted in this area could conflict with existing oil and gas activities, which may result in moderate impacts under Alternative D. Such impacts would be greater than the negligible impacts associated with Alternatives A and C.

4.19.7 Impacts of Alternative E

Impacts from Oil and Gas Development

Under Alternative E, approximately 487,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 206,400 acres would be open with NSO. The designated open lease areas would include Federal mineral estate outside of a California DWR Bulletin 118, Groundwater Basin or Sub-basin.

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 206 acres of disturbance). Alternative E would designate the second largest acreage of Federal mineral estate open to leasing (Alternative A being the largest), which would provide the BLM with greater flexibility in identifying sites for locating ground disturbance activities than under Alternatives B, C, and D. However, under each of the alternatives new oil and gas well locations would most likely be within or near established producing oil and gas fields. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative E given the expected proximity of new oil and gas development to existing production areas.

Impacts from Management Actions

For each alternative, new oil and gas related land use authorizations would be considered on a case-by-case basis but denied in exclusion areas. Unlike Alternative A but similar to the other alternatives, Alternative E would require CSU stipulations on all Federal mineral estate open to oil and gas leasing. Under Alternative E, approximately 206,400 acres would be subject to NSO stipulations, which are identified in Section 2.10 as the following:

- **ENERG-A3.** Require CSU stipulations on all public lands open to mineral leasing.
- **ENERG-A7.** Public lands outside of California DWR Bulletin 118 groundwater basins and sub-basins would be open to mineral leasing. Public lands within California DWR Bulletin 118 groundwater basins and sub-basins would be closed to mineral leasing.
- **ENERG-A8.** Require NSO stipulations for public lands open to leasing which include: (1) 12-digit Hydrologic Unit Codes (HUCs) intersecting EPA impaired, perennial surface waters (BLM surface and split estate); (2) 12-digit HUCs intersecting non-impaired, perennial surface waters that intersect split estate; (3) 12-digit HUC subwatersheds with the highest aquatic intactness score; (4) 0.25 miles from non-impaired, perennial surface waters; and (5) 0.25 miles from eligible Wild and Scenic Rivers.

Areas subject to stipulations could restrict the placement or routing of oil and gas infrastructure (i.e., roads or pipelines), which may limit access or delay energy projects. However, the above stipulations would effectively avoid conflicts between oil and gas development and existing BLM land management and land use authorizations. Of all the alternatives, Alternative E would establish the largest area to which stipulations would apply to oil and gas leases. With application of these stipulations, impacts to land use authorizations would be negligible.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative E.

Leases Subject to Settlement Agreement

Under Alternative E, approximately 57 percent of the 14 non-NSO leases would be open to leasing with CSU stipulations, 41 percent would be open in areas subject to NSO stipulations, and two percent would be closed to leasing. Unlike Alternative A, Alternative E would incorporate new restrictions in the current management goals, objectives, and direction of the lease areas from what was specified in the 2007 HFO RMP. While stipulations under Alternative E would not conflict with existing land-use authorizations, they would introduce restrictions to oil and gas extraction in areas of "high oil and gas occurrence potential." Non-energy land use authorizations that may be granted in this area could conflict with existing oil and gas activities, which may result in moderate impacts under Alternative E. Such impacts would be greater than the negligible impacts associated with Alternatives A and C.

4.20 Utility Corridors and Communication Sites

4.20.1 Introduction

This section describes the potential impacts to utility corridors and communication sites within the regions of the CCFO Planning Area that would be applicable to the Proposed RMPA. Impacts to transportation corridors within the CCFO Planning Area are discussed in Section 4.18 (Transportation and Access).

Methods of Analysis

When considering the existing oil and gas industry within the CCFO Planning Area, the regional study area for impacts to utility corridors and communication sites includes BLM-administered surface land and split estate land within the CCFO Planning Area. This area of analysis can be further defined to include only Federal mineral estate in the identified regions of high oil and gas occurrence potential, which is where future oil and gas development is most likely to occur (see Figure 3.20-1). Types of adverse effects on utility corridors and communication sites would include the following:

- Interference with the operations of existing utility infrastructure and communication facilities.
- Construction impacts from new utility infrastructure associated with oil and gas development under the Proposed RMPA.

Assumptions

The analysis is based on the following assumptions:

- The same level of oil and gas development under the 2015 RFD Scenario would apply to each alternative (i.e., 37 exploratory and development wells on 206 acres of disturbance).
- All surface-disturbing activities related to the 2015 RFD Scenario would likely occur on BLM-administered mineral estate in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential (shown in Figure 5-1) for the CCFO Planning Area.
- New oil and gas well locations developed under the 2015 RFD Scenario would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities.
- Ancillary facilities for oil and gas production (e.g., pipelines, compressor stations, etc.) and downstream activities such as oil processing at refineries and natural gas transmission and distribution are separate activities that would not be substantially affected by the RFD Scenario, aside from the need to carry produced oil and gas to the existing transmission pipeline network over a distance that is likely to be less than 10 miles.
- Electricity providers identified in Section 3.20 are assumed to have sufficient capacities to serve an increased electricity demand from oil and gas development within the CCFO Planning Area.

4.20.2 Impacts Common to All Alternatives

None of the Proposed RMPA alternatives would alter the use or designation of existing utility corridors within the CCFO Planning Area. Future expansion of utility rights in existing facilities and easements would have negligible impacts, because utility corridors would maintain their current designation and would continue to meet the needs of the State and local communities.

As discussed in Section 2.4, the 2015 RFD Scenario assumes that the current development trends in this region are likely to continue for the next 15 to 20 years. It is estimated that during the life of this RMPA, 37 total exploratory and development wells would be developed on up to 206 acres. This estimate includes all anticipated forms of ground disturbance such as the construction of well pads, roads, onsite

facilities, and pipelines. Well stimulation technologies (e.g., hydraulic fracturing, acid matrix stimulation, acid fracturing, etc.) and enhanced oil recovery techniques (e.g., cyclic steam, steam flood, water flood) may be used on any or all of the 37 wells during their life cycle. Utility-related impacts that would be the same for all alternatives include the following:

- **Oil and Gas Pipelines.** Under Alternatives A through E, the proposed 37 wells (32 wells for Alternative B) would be a minor expansion of existing oil and gas development and are not expected to require new or extensive pipeline infrastructure. New oil and gas leases would generally construct connectors to existing pipeline facilities over a distance that is likely to be less than 10 miles. Surface disturbance from the construction of pipeline connectors is included in the total estimate of up to 206 acres of disturbance.
- **Transmission Lines.** Under Alternatives A through E, well stimulation activities that may occur with the proposed oil and gas developments would require electricity from local providers. Extending existing power lines to provide a permanent supply of electricity to a new well pad or facility may be necessary. Since a new distribution power line ties into an existing distribution line or substation, the tie-in location generally occurs in previously disturbed areas and along existing ROWs or roads where the existing power line or substation is located. Electric distribution line extensions consist of the installation of new power poles, and may include vehicular travel for power pole installation in undisturbed areas. Surface disturbance from the construction of tie-ins is included in the total estimate of up to 206 acres of disturbance.
- **Communication Sites.** Under Alternatives A through E, communication facilities and ancillary equipment are permitted on public lands through ROW authorizations issued by the BLM. Per the discretion of the BLM, communication ROWs may be limited to currently occupied sites. Future oil and gas development would not be compatible with existing communication sites. As the BLM would review all ROW requests prior to their authorization, the BLM would avoid co-locating land uses or ROWs with conflicting operations.

Best Management Practices

The BLM has developed requirements for conducting environmentally responsible oil and gas operations on BLM-administered surface land and split estate land. Appendix D (Best Management Practices) includes a compilation of existing BLM policies, guidelines, and practices designed to prevent unnecessary or undue degradation of public land resources. The BLM has also identified specific oil and gas development requirements to minimize environmental impacts, which are separately published in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book). For each Application for a Permit to Drill (APD), the BLM would select and apply BMPs based on site-specific conditions to meet a variety of resource objectives for specific management actions.

4.20.3 Impacts of Alternative A (No Action)

This alternative maintains the management direction of the 2007 HFO RMP. Any new lease applications would be reviewed by the BLM to avoid conflicts with existing land uses or ROW designations. With BLM's management of ROW authorizations, none of the alternatives would interfere with the operations of existing utility infrastructure and communication facilities. Impacts to existing utility corridors and communication sites would be negligible.

New oil and gas well locations would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities. Surface disturbance from the construction of ancillary oil and gas facilities (e.g., pipelines and connectors, compressor stations, transmission tie-ins) would represent a small portion of the total anticipated disturbance from oil and gas development (206 acres), which is a minimal area of impact given the size of the BLM's management area for the CCFO.

As part of each future permit or authorization for a facility, the BLM would identify BMPs (see Appendix D) to be implemented during construction and operation of all oil and gas ancillary facilities. Under Alternative A, surface disturbance impacts associated with oil and gas development would be long-term but moderate given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BMPs for oil and gas operations.

As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 37 wells and 206 acres of disturbance); consequently, adverse effects from the construction of new utility facilities associated with oil and gas development would be identical for Alternatives A through E.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative A.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A Subalternative 1, the 14 non-NSO leases subject to the settlement agreement would be issued. New oil and gas wells would be likely to require short segments of pipeline to reach existing pipeline infrastructure. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative A Subalternative 1 given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BLM standards and guidelines for oil and gas operations. Adverse effects from new utility facilities would be less severe (i.e., minor) under Alternatives B and D, which would close more than three-fourths of the proposed lease areas to oil and gas development.

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.20.4 Impacts of Alternative B

Under Alternative B, approximately 39,000 acres of Federal mineral estate would be open to oil and gas leasing. New oil and gas well locations would be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities. As part of each future permit or authorization for a facility, the BLM would identify BMPs (see Appendix D) to be implemented during construction and operation of all oil and gas ancillary facilities. Under Alternative B, surface disturbance impacts associated with oil and gas development would be long-term but moderate given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BMPs for oil and gas operations. Slightly less oil and gas development would apply to Alternative B (i.e., 32 wells and 179 acres of disturbance); consequently, adverse effects from the construction of new utility facilities associated with oil and gas development under Alternative B could be slightly less.

Impacts to existing utility corridors and communication sites would be negligible. With BLM's management of ROW authorizations, none of the alternatives would interfere with the operations of existing utility infrastructure and communication facilities.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative B.

Leases Subject to Settlement Agreement

Under Alternative B, approximately 78 percent of the 14 non-NSO leases would be closed to leasing. Surface disturbance impacts associated with oil and gas development would be long-term, but minor under Alternative B given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BLM standards and guidelines for oil and gas operations. The minor effects from Alternative B would be similar to Alternative D as both alternatives would allow less than one-quarter of the proposed leases to be open to oil and gas development. Impacts from the 14 non-NSO leases would be greater under Alternatives A, C, and E, which would allow between 98 to 100 percent of the 14 proposed lease areas to be open to oil and gas development.

4.20.5 Impacts of Alternative C

Under Alternative C, approximately 368,800 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 29,800 would be open with NSO. New oil and gas well locations would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities. As part of each future permit or authorization for a facility, the BLM would identify BMPs (see Appendix D) to be implemented during construction and operation of all oil and gas ancillary facilities. Under Alternative C, surface disturbance impacts associated with oil and gas development would be long-term but moderate given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BMPs for oil and gas operations. As described in Section 2.5.2, the same level of oil and gas development would apply to Alternatives A and C through E (i.e., 37 wells and 206 acres of disturbance); consequently, adverse effects from the construction of new utility facilities associated with oil and gas development would be identical for these alternatives.

Impacts to existing utility corridors and communication sites would be negligible. With BLM's management of ROW authorizations, none of the alternatives would interfere with the operations of existing utility infrastructure and communication facilities.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative C.

Leases Subject to Settlement Agreement

Under Alternative C, the 14 non-NSO leases would be in BLM-managed areas that are open to leasing. New oil and gas wells would be likely to require short segments of pipeline to reach existing pipeline infrastructure. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative C given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BLM standards and guidelines for oil and gas operations. Adverse effects from new utility facilities would be less severe (i.e., minor) under Alternatives B and D, which would close more than 75 percent of the proposed lease areas to oil and gas development.

4.20.6 Impacts of Alternative D

Under Alternative D, approximately 121,200 acres of Federal mineral estate would be open to oil and gas leasing and 16,400 acres would be open with NSO. New oil and gas well locations would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities. As part of each future permit or authorization for a facility, the BLM would identify BMPs (see Appendix D) to be implemented during construction and operation of all oil and gas ancillary faci-

lities. Under Alternative D, surface disturbance impacts associated with oil and gas development would be long-term but moderate given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BMPs for oil and gas operations. As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 37 wells and 206 acres of disturbance); consequently, adverse effects from the construction of new utility facilities associated with oil and gas development would be identical for Alternatives A through E.

Impacts to existing utility corridors and communication sites would be negligible. With BLM's management of ROW authorizations, none of the alternatives would interfere with the operations of existing utility infrastructure and communication facilities.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative D.

Leases Subject to Settlement Agreement

Under Alternative D, approximately 25 percent of the proposed 14 non-NSO leases would be open to leasing with CSU stipulations. New oil and gas wells would be likely to require short segments of pipeline to reach existing pipeline infrastructure. Surface disturbance impacts associated with oil and gas development would be long-term, but minor under Alternative D given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BLM standards and guidelines for oil and gas operations. The minor effects from Alternatives B and D would be similar as both alternatives would allow less than 25 percent of the proposed leases to be open to oil and gas development. Impacts from the 14 non-NSO leases would be greater under Alternatives A, C, and E, which would allow between 98 to 100 percent of the 14 proposed lease areas to be open to oil and gas development.

4.20.7 Impacts of Alternative E

Under Alternative E, approximately 487,200 acres of Federal mineral estate would be open to oil and gas leasing with CSU stipulations and 206,400 acres would be open with NSO. New oil and gas well locations would likely be within, or proximate to, established producing oil and gas fields or near lands that are already leased for such activities. As part of each future permit or authorization for a facility, the BLM would identify BMPs (see Appendix D) to be implemented during construction and operation of all oil and gas ancillary facilities. Under Alternative E, surface disturbance impacts associated with oil and gas development would be long-term but moderate given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BMPs for oil and gas operations. As described in Section 2.5.2, the same level of oil and gas development would apply to each alternative (i.e., 37 wells and 206 acres of disturbance); consequently, adverse effects from the construction of new utility facilities associated with oil and gas development would be identical for Alternatives A through E.

Impacts to existing utility corridors and communication sites would be negligible. With BLM's management of ROW authorizations, none of the alternatives would interfere with the operations of existing utility infrastructure and communication facilities.

Mitigation

The BLM would require BMPs, stipulations, and other COAs during its project- and site-specific review and approval of oil and gas lease applications and APDs. No additional mitigation is recommended for Alternative E.

Leases Subject to Settlement Agreement

Under Alternative E, approximately 98 percent of the proposed 14 non-NSO leases would be open to leasing with CSU or NSO stipulations. New oil and gas wells would be likely to require short segments of pipeline to reach existing pipeline infrastructure. Surface disturbance impacts associated with oil and gas development would be long-term, but would be moderate under Alternative E given BLM's compliance with 43 CFR 2806 (which directs the BLM to place new utility facilities within established corridors), and incorporation of BLM standards and guidelines for oil and gas operations. Adverse effects from new utility facilities would be less severe (i.e., minor) under Alternatives B and D, which would close more than 75 percent of the proposed lease areas to oil and gas development.

4.21 Wild and Scenic Rivers

4.21.1 Introduction

As discussed in Section 3.21, the BLM determined that none of the 11 eligible river segments in the Central Coast Field Office (CCFO) Planning Area were suitable for inclusion in the National Wild and Scenic River (NWSR) System (BLM, 2014; Appendix VI). However, the BLM must implement the management direction provided in the Wild and Scenic Rivers Act to protect an eligible river's outstanding remarkable values until Congress designates the river or releases it for other uses. This section provides an analysis of the potential impacts of the Proposed RMPA on eligible Wild and Scenic Rivers within the CCFO Planning Area, and recommends mitigation if necessary to minimize or avoid impacts. Designated NWSRs would not cross or be located in the vicinity of Federal mineral estate (see Section 3.21.4), and as such would not be affected by the Proposed RMPA. Refer to Sections 4.8 (Surface Water Resources), 4.10 (Biological Resources – Vegetation), 4.11 (Biological Resources – Wildlife Habitat), 4.12 (Biological Resources – Special Status Species), and 4.13 (Visual Resource Management) for a discussion of additional mitigation that may be required to ensure resource protection within the CCFO Planning Area during oil and gas development.

Methods of Analysis

The area of analysis includes eligible NWSR segments that are within the CCFO Planning Area. Impacts to Wild and Scenic Rivers would include the following:

- Direct impacts include any action that would modify the watercourse/streambed (e.g., impoundments, channelization or diversions).
- Indirect impacts would result from actions (either BLM or others) that remove water from the river above the segment and reduce in-stream flows below an acceptable level, or contribute to degradation of the river's outstanding remarkable value.

Assumptions

The analysis is based on the following assumption:

- All river segments found to be eligible for inclusion in the NWSR System are placed under protective management by the BLM. Subject to valid existing rights, the BLM is required to protect the free-flowing characteristics and outstandingly remarkable values in the stream corridors.

4.21.2 Impacts Common to All Alternatives

As discussed in Section 3.21.2, the BLM must provide protective measures to maintain the outstanding remarkable values of all eligible NWSR segments. Outstandingly remarkable values for eligible river segments within the CCFO Planning Area are listed in Table 3.21-1.

NWSR designation ensures that many forms of development do not compromise a river's free-flowing character, water quality and quantity, or social and ecological values. As described in Section 3.21.2, the designated NWSR boundary generally extends 0.25 miles from either bank. Activities such as mining and oil and gas drilling may be restricted by a NWSR designation if they cannot be undertaken without harming a river's free-flowing condition, water quality, or remarkable values.

None of the alternatives under the Proposed RMPA would alter the designation of eligible river segments, which can only be done through Congressional legislation. In compliance with the Wild and Scenic Rivers Act (see Section 3.21), the BLM would be required to enact management restrictions to protect eligible NWSRs and these restrictions would apply to all of the Proposed RMPA alternatives. The following impact analysis identifies whether an alternative would require additional stipulations to protect the characteristics and remarkable values of eligible NWSR segments.

4.21.3 Impacts of Alternative A (No Action)

Under Alternative A, the following eligible NWSR segments would extend into Federal mineral estate open to oil and gas development: Cantua Creek, Clear Creek, East Fork San Carlos Creek, Larious Creek, Picacho Creek, San Benito River, and White Creek. The majority of the Federal mineral estate that may be open to leasing would not be subject to NSO stipulations under Alternative A. Only a small area of Federal mineral estate subject to NSO stipulations would be crossed by the Cantua Creek segment.

Given the lack of stipulations along the eligible NWSR segments, major impacts could occur during oil and gas development activities under Alternative A. For example, surface disturbance during construction and maintenance (e.g., establishment of access roads, wellpads, flowlines, pipelines, etc.) could increase soil erosion, which may increase turbidity and sedimentation in nearby streams. Vegetation clearing required during construction activities would further contribute to soil erosion. During construction and operation, hazardous materials could be released from construction vehicles, wells, or flowlines, which may contaminate local waterways. These impacts would be long-term and could permanently degrade the rivers' outstanding remarkable value(s).

Without stipulations, impacts to eligible NWSRs under Alternative A would be the most severe of all the Proposed RMPA alternatives.

Leases Subject to Settlement Agreement – Subalternative 1

Under Alternative A, the 14 proposed leases would be open to oil and gas development and would not be subject to NSO stipulations. Of the 11 eligible NWSR segments in the CCFO Planning Area, two river segments are in close proximity to the non-NSO leases: the East Fork San Carlos Creek segment that extends into a non-NSO lease, and the Larious Creek segment that is less than one mile south of the non-NSO leases. Given the lack of stipulations that would apply to oil and gas development activities (e.g., sedimentation, water contamination) near eligible river segments, major impacts could occur. These impacts would be long-term and could permanently degrade the rivers' outstanding remarkable value(s). Impacts under Alternatives A (Subalternative 1) and C would be similar given the lack of NSO stipulations for both alternatives. Impacts would be less severe under Alternatives B, D, and E due to the application of stipulations or the closure of some lease areas to oil and gas development (see Sections 4.21.4 through 4.21.7).

Leases Subject to Settlement Agreement – Subalternative 2

The two non-NSO leases as identified in Case No. 11-06174 should not have been issued, and the 12 prospective non-NSO leases as identified in Case No. 13-1749 would not be issued. As such, no resource impact would occur.

4.21.4 Impacts of Alternative B

Under Alternative B, none of the eligible NSWR segments would extend into Federal mineral estate open to oil and gas development. All Federal mineral estate traversed by the eligible NWSR segments would be closed to leasing. Indirect impacts may occur if oil and gas activities along a non-designated upper river area would contribute to adverse effects on lower river segments under designation. However, these indirect effects are not likely to occur under the Proposed RMPA given that the upper reaches of the eligible river segments are located in the Clear Creek Serpentine ACEC, which is closed to oil and gas development. As no oil and gas development activities would occur in the vicinity of the eligible portions of the river segments, impacts would be expected to be negligible. Alternative B would have the least impact to NWSRs of all the Proposed RMPA alternatives.

Mitigation

No mitigation is recommended for Alternative B.

Leases Subject to Settlement Agreement

While 21 percent of the acreage for the proposed non-NSO leases would be open to oil and gas development under Alternative B, none of the open lease areas would be traversed by an eligible NWSR segment. As no oil and gas development activities would occur in the vicinity of the eligible portions of the river segments, impacts would be expected to be negligible. Negligible impacts under Alternative B would be similar to Alternative D, which would also close Federal mineral estate to leasing in the vicinity of eligible NWSRs, and to Alternative A (Subalternative 2) where no impacts would occur. Impacts would be more severe under Alternatives A (Subalternative 1), C, and E given that these alternatives include open lease areas near eligible NWSRs.

4.21.5 Impacts of Alternative C

Under Alternative C, the following eligible NWSR segments would extend into Federal mineral estate open to oil and gas development: Cantua Creek, East Fork San Carlos Creek, and White Creek. Federal mineral estate open to leasing under Alternative C would not be subject to NSO stipulations in the vicinity of eligible NWSRs.

Alternative C includes a greater area closed to oil and gas development along the eligible NWSR segments than Alternatives A, D, and E. However, given the lack of stipulations that would apply to the open areas around the eligible segments, major impacts could still occur during oil and gas development activities. For example, surface disturbance during construction and maintenance could increase soil erosion, which may increase turbidity and sedimentation in nearby streams. During construction and operation, hazardous materials could be released from construction vehicles, wells, or flowlines, which may contaminate local waterways. These impacts would be long-term and could permanently degrade the rivers' outstanding remarkable value(s).

Without stipulations, impacts to NWSRs under Alternative C would be more severe than Alternative B. Impacts may be less severe than Alternatives A and D due to the greater area closed to leasing near eligible NWSRs under Alternative C. The degree of impact for Alternatives C and E may be similar, as they both increase either the acreage of areas closed to leasing or subject to NSO stipulations.

Mitigation

In order to protect eligible NWSRs from impacts to their free-flowing conditions, water quality, or outstanding remarkable values, the following mitigation measure is recommended for Alternative C.

WSR-1 **Apply Lease Stipulations along Eligible NWSR Segments.** Oil and gas lease stipulations shall be required as a Condition of Approval within 0.25 miles[1] of an eligible NWSR segment. Prior to granting an oil and gas lease, the BLM shall identify one of the following stipulations to be applied to the lease permit: No Surface Occupancy or Controlled Surface Use. Lease stipulations shall comply with the guidelines that are fully described in Appendix C (Hollister Oil and Gas Stipulations).

Additionally mitigation in Sections 4.8 (Surface Water Resources), 4.10 (Biological Resources – Vegetation), 4.11 (Biological Resources – Wildlife Habitat), 4.12 (Biological Resources – Special Status Species), and 4.13 (Visual Resource Management) may be required and would help ensure resource protection for NWSRs.

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[1] Designated protection boundaries for federally administered rivers generally average one-quarter mile on either bank in the lower 48 states and one-half mile on rivers outside national parks in Alaska (NWSRS, 2015a).

Leases Subject to Settlement Agreement

Under Alternative C, the 14 proposed leases would be open to oil and gas development and would not be subject to NSO stipulations. Two of the eligible NWSR segments (i.e., Larious Creek and San Carlos Creek) would be located in close proximity to the non-NSO leases in San Benito County. Of the 11 eligible NWSR segments in the CCFO Planning Area, two river segments are in close proximity to the non-NSO leases: the East Fork San Carlos Creek segment that extends into a non-NSO lease, and the Larious Creek segment that is less than one mile south of the non-NSO leases. Given the lack of stipulations that would apply to oil and gas development activities (e.g., sedimentation, water contamination) near eligible river segments, major impacts could occur. These impacts would be long-term and could permanently degrade the rivers' outstanding remarkable value(s). Impacts under Alternatives C and A (Subalternative 1) would be similar given the lack of NSO stipulations for both alternatives. Impacts would be less severe under Alternatives A (Subalternative 2), B, D, and E due to the application of stipulations or the closure of some lease areas to oil and gas development.

4.21.6 Impacts of Alternative D

Under Alternative D, the following eligible NWSR segments would extend into Federal mineral estate open to oil and gas development: Cantua Creek, East Fork San Carlos Creek, Picacho Creek, San Benito River, and White Creek. Federal mineral estate open to leasing under Alternative D would not be subject to NSO stipulations in the vicinity of eligible NWSRs.

For Alternatives A and D, the designation of Federal mineral estate open or closed to oil and gas development around eligible river segments is similar, with Alternative D having a small increase in the amount of public land closed to leasing near Larious Creek, and East Fork San Carlos Creek, and San Benito River. Alternatively, Alternative A would include a small area of Federal mineral estate subject to NSO stipulations that would be crossed by Cantua Creek.

Given the lack of stipulations along the eligible NWSR segments, major impacts could occur during oil and gas development activities under Alternative D. For example, surface disturbance during construction and maintenance could increase soil erosion, which may increase turbidity and sedimentation in nearby streams. During construction and operation, hazardous materials could be released from construction vehicles, wells, or flowlines, which may contaminate local waterways. These impacts would be long-term and could permanently degrade the rivers' outstanding remarkable value(s).

Without stipulations, impacts to NWSRs under Alternative D would be more severe than Alternatives B, C, and E. Impacts may be slightly less severe than Alternative A due to the small increase in acreage closed to leasing near eligible NWSRs under Alternative D.

Mitigation

In order to protect eligible NWSRs from impacts to their free-flowing conditions, water quality, or outstanding remarkable values, the following mitigation measure is recommended for Alternative D.

WSR-1 **Apply Lease Stipulations along Eligible NWSR Segments.** See full text for this measure under Section 4.21.3, Impacts of Alternative C.

Additionally mitigation in Sections 4.8 (Surface Water Resources), 4.10 (Biological Resources – Vegetation), 4.11 (Biological Resources – Wildlife Habitat), 4.12 (Biological Resources – Special Status Species), and 4.13 (Visual Resource Management) may be required and would help ensure resource protection for NWSRs.

Leases Subject to Settlement Agreement

Under Alternative D, the 14 proposed leases that would be in proximity to eligible NWSR segments would be closed to oil and gas development. As no oil and gas development activities would occur in the vicinity of the eligible portions of the river segments, impacts would be negligible. Negligible impacts under Alternatives B and D would be similar as they both close Federal mineral estate to leasing in the vicinity of eligible NWSRs, and Alternative A (Subalternative 2) would have no impacts. Impacts would be more severe under Alternatives A (Subalternative 1), C, and E, given that these alternatives include open lease areas near eligible NWSRs.

4.21.7 Impacts of Alternative E

Under Alternative E, the following eligible NWSR segments would extend into Federal mineral estate open to oil and gas development: Cantua Creek, Clear Creek, East Fork San Carlos Creek, Larious Creek, Picacho Creek, San Benito River, and White Creek. NSO stipulations would apply to a larger area of public land surrounding these river segments than under Alternatives A, C, and D.

Given the application of stipulations that would apply to much of the open lease areas around eligible river segments, impacts from oil and gas development would be moderate under Alternative E. Long-term and permanent effects could still occur from oil and gas development within non-NSO lease areas (e.g., sedimentation, water contamination). Without stipulations in some of the open lease areas along eligible NWSRs, impacts under Alternative E would be more severe than Alternative B. Impacts may be less severe than Alternatives A, C, and D due to the greater acreage of Federal mineral estate subject to NSO stipulations under Alternative E.

Mitigation

In order to protect eligible NWSRs from impacts to their free-flowing conditions, water quality, or outstanding remarkable values, the following mitigation measure is recommended for Alternative E.

WSR-1 **Apply Lease Stipulations along Eligible NWSR Segments.** See full text for this measure under Section 4.21.3, Impacts of Alternative C.

Additionally mitigation in Sections 4.8 (Surface Water Resources), 4.10 (Biological Resources – Vegetation), 4.11 (Biological Resources – Wildlife Habitat), 4.12 (Biological Resources – Special Status Species), and 4.13 (Visual Resource Management) may be required and would help ensure resource protection for NWSRs.

Leases Subject to Settlement Agreement

Under Alternative E, the 14 proposed leases in proximity to an eligible NWSR segment would be subject to NSO stipulations. Impacts to eligible portions of the river segments may occur over the long-term, but would be minor given the application of NSO stipulations that would provide protective management for these stream corridors. Impacts to eligible NWSRs would be less severe under Alternative E than Alternatives A (Subalternative 1) and C (due to their lack of stipulations in open lease areas), and more severe than Alternatives A (Subalternative 2), B and D (due to their larger acreage of areas closed to leasing).

Chapter 5

Cumulative Impacts

5. Cumulative Impacts

5.1 Introduction

The Council on Environmental Quality (CEQ) defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). The CEQ suggests cumulative impact analyses should focus on meaningful impacts, and not exhaustively analyze all possible cumulative impacts (CEQ, 1997). Therefore, the analysis in this RMPA and EIS focuses on past, present, and future actions that are anticipated to have environmental impacts similar to or impacting the same resources as, the direct and indirect impacts identified for each of the alternatives. Cumulative projects include those actions that result in meaningful impacts to historically important resources, those with a potential for violating legal standards or laws, or other identified projects or actions in the geographic scope that relate to the identified issues. Cumulative impacts will be analyzed only for those resources that have identified direct or indirect impacts.

5.1.1 Geographic Scope

The geographic scope for which the list of cumulative projects was determined includes the 12 counties within the boundary of the CCFO Planning Area. However, the specific geographic scope for each resource area will vary due to the different nature and extent of that resource. Each issue area analysis will consider the appropriate geographic scope due to the different nature and extent of the impacted resource area. The appropriate boundary depends on the accumulation characteristics of the effects being assessed (CEQ, 1997).

5.1.2 Timeframe

The timeframe of past, present, and probable future projects was determined as follows:

- **Past and Present Oil and Gas Development.** Existing oil and gas exploration and development as defined in the CCFO Reasonably Foreseeable Development (RFD) Scenario (see Appendix B), which reflects the cumulative baseline or existing conditions; projects other than oil and gas are reflected in the existing environment in Chapter 3;
- **Reasonably Foreseeable Development Scenario.** An estimate of the level and type of future oil and gas activity in the CCFO Planning Area (see Appendix B);
- **Reasonably Foreseeable Future Action.** Includes oil, gas, and other relevant projects that have either: submitted permit applications, begun the environmental review process, been approved, or are under construction within the geographic scope. These projects were identified from a review of the 2015 RFD Scenario, the 2007 HFO RMP and Final EIS (BLM, 2007), and the California Department of Conservation's (DOC) Division of Oil, Gas, and Geothermal Resources (DOGGR) Analysis of Oil and Gas Well Stimulation Treatments (DOC, 2015).

5.2 Past, Present, and Reasonably Foreseeable Future Actions

5.2.1 Past and Present Oil and Gas Exploration and Development

As of mid-2014, there are 127 authorized oil and gas leases on Federal mineral estate within the CCFO Planning Area covering an estimated 41,360 acres. Eighty (80) producing/active oil and gas wells are located on Federal mineral estate within the CCFO Planning Area (CCST, 2015).

As described in the 2015 RFD Scenario, recent well drilling activity has not been evenly distributed across the CCFO Planning Area. Of the 12 counties in the CCFO Planning Area, five have had some recent levels of new well activity. However, existing wells are located on BLM-administered land only in the following counties: Contra Costa, Fresno, Monterey, San Benito, and Santa Cruz. No wells are located on BLM-administered land in Alameda, Merced, San Francisco, San Joaquin, San Mateo, Santa Clara, or Stanislaus Counties. In general, most of the new well activity in the counties covered by CCFO Planning Area occurs in Fresno County and in Monterey County (CCST, 2015).

The history of activity for oil and gas exploration and development on Federal lands within the planning area is minimal compared to private minerals. The most productive oil and gas fields in the CCFO Planning Area, in order of cumulative past production, include the following:

- Coalinga and Coalinga East Extension (Fresno County);
- San Ardo (Monterey);
- Lynch Canyon (Monterey);
- Jacalitos (Fresno);
- Kettleman North Dome (Fresno); and
- Hollister-Sargent (San Benito/Santa Clara).

In the last decade, nearly all well development occurred in the Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields. Recent activity indicates that an annual average rate of between 140 and 210 wells per year have had first production or injection since 2002 in the region. Assuming that the development trend in this region is likely to continue for the next 15 to 20 years, up to 3,150 wells could be initiated over 15 years with over 99 percent of these wells located within the Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields.

New oil and gas activity in the CCFO Planning Area has involved only limited levels of well stimulation by hydraulic fracturing, and for counties within the CCFO Planning Area. In the Fresno County portion of the CCFO Planning Area, which has the highest level of well stimulation, 4 percent of recently producing wells indicate any record of previous hydraulic fracturing (see Appendix B, RFD Scenario).

5.2.2 Reasonably Foreseeable Development Scenarios

The 2015 RFD Scenario was developed to estimate the level and type of future oil and gas activity in the CCFO Planning Area, and to provide a basis for assessing cumulative impacts. This 2015 RFD Scenario is applicable to all alternative scenarios, because the alternatives considered in the RMPA/EIS consider which BLM-administered lands to open or close to leasing, which would not impact the assumptions.

Furthermore, the RFD Scenario identifies areas within the CCFO Planning Area that have been categorized as high, moderate, and low to no occurrence potential, as summarized below and shown in Figure 5-1. Based on further analysis of the geology of the area and updated information, the areas of oil and gas occurrence potential have been modified from the 2007 HFO RFD Scenario for Oil and Gas. For a more detailed discussion of the oil and gas occurrence potential and the differences from the 2007 HFO RFD Scenario for Oil and Gas, see Appendix B.

High Oil and Gas Occurrence Potential

As illustrated in Figure 5-1, high oil and gas occurrence potential is located in southern San Benito County, southeastern Monterey County and western Fresno County. This area is part of the San Joaquin Basin and the Salinas Basin. The San Joaquin Basin has 8 oil fields that produce from Miocene and Pliocene marine sedimentary rocks. The Coalinga Field, located in western Fresno County, is the most productive field in the CCFO Planning Area and is currently the eighth largest oil and gas field in California. The entire San Joaquin Basin in the CCFO Planning Area is underlain by oil and gas plays, except for a 9-by-4-mile strip in the far northwest corner of the basin, just west of Westley.

Moderate Oil and Gas Occurrence Potential

The Sacramento Basin in the northeastern portion of the Planning Area has moderate oil and gas occurrence potential. There are 12 productive oil and gas fields and three abandoned fields in this area.

The La Honda Play is located within the northwestern area of the CCFO Planning Area. Four oil fields have been developed within this play. In 1983, there were estimated reserves of 1.7 million barrels of oil equivalents (MMBOE).

Low to No Oil and Gas Occurrence Potential

Within the CCFO Planning Area, the areas of low or no oil and gas occurrence potential are areas that are underlain dominantly by granitic, volcanic, metamorphic, and ophiolitic series rocks, as well as rocks of the Franciscan Formation. These areas of low or no oil and gas occurrence potential are shown on Figure 5-1.

5.2.3 Reasonably Foreseeable Future Actions

Oil and Gas Projects

Table 5-1 lists future oil and gas exploration and development projects that have been identified within the geographic scope.

Table 5-1. Cumulative Oil and Gas Projects

Project Name	Description	Location	Status
Phillips 66 Propane Recovery Project	Modification of 495-acre refinery to recover butane and propane from refinery fuel gas	Rodeo area, Contra Costa County	Operational, modification in environmental review

Sources: DOC, 2015.

Other Applicable Cumulative Projects

Other major projects producing related or cumulative effects, including large surface area disturbance, noise, air pollution, greenhouse gas emissions, water pollution, the use of hazardous materials, and/or high water usage, are included in this section. These projects include development projects, resource extraction activities, power generating facilities, renewable and non-renewable energy projects, large-scale infrastructure, flood control, and road improvement projects. The estimated average annual water use for irrigated cropland in California from 1998 to 2005 is summarized in Table 5-3. The estimates are provided for each hydrologic region within the CCFO Planning Area, as defined by the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB). The time frame considered in the EIS is a 10- to 15-year horizon. The cumulative analysis conservatively considers that future agricultural water use within this time frame will not vary substantially from that revealed in the data in the table below.

Table 5-2. Other Applicable Cumulative Projects

Project Name	Description	Location	Status
Alameda County			
Next Era Wind Repowering Project	135.7 MW; 8,950-acre wind repowering project	North and south of I-580, southeastern Contra Costa county and northeastern Alameda County	Environmental Review
SMP 30 Sunol Quarry Project (Expansion)	Quarry expansion project	Sunol, Alameda County	Environmental Review
Summit Wind Project (Altamont Winds)	95 MW; 7,650-acre wind project	South of I-580, northeastern Alameda County	Environmental Review

Table 5-2. Other Applicable Cumulative Projects

Project Name	Description	Location	Status
Contra Costa County			
No applicable cumulative projects have been identified in Contra Costa County.			
Fresno County			
Austin Quarry	671-acre aggregate mining project	8 miles north of Fresno, Fresno County	Environmental Review
Carmelita Aggregate Mine	900-acre aggregate mine	East of Sanger, Fresno County	Approved
Jesse Morrow Mountain Mine and Reclamation Project	824-acre aggregate mining, processing, and distribution facility	East of Sanger, Fresno County	Environmental review
Riverbend Sand and Gravel Project	619-acre aggregate mine	Southeast of Sanger, Fresno County	Environmental review
Tranquility Solar Generating Station	3,800-acre; 400 MW solar generating facility	Southwest of Tranquility, Fresno County	Approved
Merced County			
Don Chapin Concrete Batch Plant Project	26.9-acre project for the delivery and storage of materials, concrete mixing	Volta, west-central Merced County	Environmental Review
Leo/Vega Solar Project	1,009-acre; 150 MW solar PV power plant	Southwestern Merced County adjacent to I-5	Approved
Snellings Tailings Project	409-acre, dredge tailings removal project	Snelling, northeastern Merced County	Approved
Sumpter Project Mine and Reclamation Project	28-acre sand removal project	West of Atwater, Merced County	Approved
Wright Solar Park	1,600-acre; 200 MW solar PV power plant	Western Merced County	Environmental Review
Monterey County			
Stonewall Quarry	33-year extension of permit for 53-acre surface mine	2 miles northeast of Soledad, Monterey County	Active, Environmental review for extension
California Flats Solar	280 MW PV solar project	4 miles southeast of Parkfield, Monterey County	Environmental review
San Benito County			
Solargen Panoche Valley Solar Project	10,000+ acres; 1,000 MW solar facility	East-central San Benito County	Approved by County; NEPA environmental review ongoing
San Joaquin County			
Hendrick Pit	Aggregate mine	San Joaquin County	Approved
KRC Aggregates Mine Expansion Project	1,059-acre expansion to existing 1,048-acre quarry	Between Clements and Wallace, San Joaquin County	Approved
Tracy Lakes Quarry Excavation Project	Aggregate mine	6.5 miles northwest of Lodi, San Joaquin County	Approved
East and West Vernalis	Aggregate mines	Vernalis, San Joaquin County	Approved
Vernalis	Aggregate mine	Vernalis, San Joaquin County	Approved
Stanislaus County			
Riddle Surface Mine	436-acre aggregate mine	3 miles northwest of Newman, Stanislaus County	Environmental Review

Source: DOC, 2015.

Table 5-3. Average Annual Water Use for Irrigated Cropland 1998-2005

Hydrologic Region	Irrigated Crop Area[1] (thousands of acres)	Quantity of Applied Water[2] (million acre-feet)
San Francisco Bay	81	0.1
Central Coast	430	1.0
San Joaquin River	1,900	7.0
Tulare Lake	3,000	10.0

1 - The total amount of land irrigated for the purpose of growing a crop. Some land is cropped more than once during the year, so irrigated crop acreage exceeds irrigated land area
2 - Gross water use, includes water available for reuse
Source: DOC, 2015.

Reasonably Foreseeable Proposed ACEC Expansion

The CCFO is currently analyzing the potential expansion of the Panoche-Coalinga ACEC in southern San Benito and western Fresno Counties. The proposal is considering expanding existing ACEC and RNA designations to existing and acquired public lands, emphasizing recovery of special status species. The decisions related to oil and gas leasing within the potentially expanded ACEC would be made through this oil and gas leasing and development RMPA. Under the current range of alternatives in this EIS, the acreage within the potential expansion fall within a range of areas open to leasing with CSU stipulations, open to leasing with NSO stipulations, and closed to leasing.

5.3 Cumulative Impacts

5.3.1 Energy and Minerals

Cumulative impacts to energy and minerals would occur if impacts of the oil and gas development under the RFD Scenario combine with other projects or actions within the Planning Area to reduce access to or the development of energy or mineral resources. The geographic scope would be the Planning Area because decisions or development within the Planning Area are unlikely to impact developers outside of the Planning Area.

The BLM management decisions regarding energy are unlikely to combine with the list of cumulative projects to reduce the development of oil or gas in the CCFO Planning Area. This is because Counties take into consideration the need for energy during their General Plan and set aside areas for such development. Prior to approval of any of the projects listed in Table 5-2, the Counties would analyze whether the projects would restrict use of other resources such as energy and would reduce any loss of access if feasible and applicable. Alternatives A, C, D, and E are all expected to have minimal contributions to cumulative effects. Alternative B would place the most restrictions on where energy could be developed in the CCFO Planning Area on Federal mineral estate. This would result in a minor contribution to cumulative restrictions to energy development reducing the future energy development potential in this area.

As noted in Section 4.2, development of up to 37 wells in the CCFO Planning Area on up to 206 acres of land would result in only a minor loss of access to mineral resources. The majority of projects listed in Table 5-2 are mines and would not result in a cumulative loss of mineral resources when combined with the RMPA/EIS alternatives. While the renewable projects listed in Table 5-2 would require use of a large amount of acreage, each County would analyze whether the renewable projects would restrict other uses of the lands and mitigate for such loss. Consequently, cumulative impacts to minerals would be minor.

5.3.2 Geology

The geographic area considered for cumulative effects related to geologic hazards is within a 0.5-mile radius of open areas for all alternatives for seismic events. This is because impacts resulting from seismic events are localized in nature and are unlikely to extend beyond the actual oil and gas occurrence boundaries.

An oil and gas development would expose people and/or structures to geologic hazards, and a cumulative effect could occur if another project within a 0.5-mile radius would also expose people and/or structures to geologic hazards. The majority of the Federal mineral estate lands where the RFD Scenario would occur for Alternatives A, C, D, and E are not within 0.5-miles of other cumulative projects or existing infrastructure except within existing oil and gas fields. Cumulative effects due to ground shaking and other seismic events would therefore be limited in nature. Alternative B would limit the locations of the 37 wells to existing oil and gas fields and a buffer, but even in this instance, cumulative geologic effects are limited because each oil field development is required to provide civil engineering studies or geotechnical studies prior to developing the wells. Oil and gas development workers would be most at risk should a cumulative effect occur.

The potential for cumulative induced seismicity due to the combination of the RFD Scenario and the reasonably foreseeable future actions is low as there are only three cumulative oil and gas projects presented in Table 5-1 and it is unknown if they would undergo well stimulation activities. In addition, the current use of well stimulation technologies (including hydraulic fracturing) in California is not considered to pose a significant seismic hazard (CCST, 2014). Induced seismicity has been linked to the injection of large volumes of wastewater into deep disposal wells in the eastern and central United States (CCST, 2014). Currently, the volume of wastewater injected underground in California is small compared to other states, and the depth of the injection wells is comparatively shallow (CCST, 2014). The current risk of induced seismicity from wastewater disposal in California is small; however, with an increase in well stimulation treatments and an increase in wastewater injection (including from future cumulative projects), the risk of induced seismicity may increase (CCST, 2014). Further studies of the relationship, if any, between wastewater injection, seismicity and faulting in California will be needed to establish this with confidence and to provide a better idea of incremental hazard levels due to induced seismicity (CCST, 2015). The probability of inducing larger, hazardous earthquakes by wastewater disposal could likely be reduced by following protocols similar to those that have been developed for other types of injection operations, such as enhanced geothermal (CCST, 2015). Even though hydraulic fracturing itself rarely induces felt earthquakes, application of similar protocols could protect against potential worst-case outcomes resulting from wastewater injection activities (CCST, 2015).

5.3.3 Hazardous Materials and Public Safety

The geographic scope for cumulative analysis for hazardous materials and public safety is generally within the oil and gas project boundaries and along the access routes or pipeline routes. This is where hazardous materials and public safety effects are generally localized. Because oil and gas projects could be built anywhere within the open areas, the geographic scope for cumulative impact analysis is anywhere within the open areas and access routes for the entire CCFO Planning Area and along the pipelines.

Many of the effects of oil and gas development analyzed in Section 4.4 would only have the potential to contribute to a cumulative effect with the oil and gas development listed in Table 5-1. These include impacts such as public exposure to hazards of oil and gas operations, well blowouts, subsurface contamination, irrigation with produced water, pressurized gas releases, and transportation of crude oil and gas by pipeline. The cumulative effects of the oil and gas development listed in Table 5-1 and the development anticipated in the 2015 RFD Scenario would slightly increase the risk of these effects but due to the low number of oil and gas wells, the risk would be similar to that discussed in Section 4.4, Hazardous Materials and Public Safety.

All phases of oil and gas development would involve the transport, use, storage, and disposal of hazardous materials. The projects listed in Tables 5-1 and 5-2 use similar hazardous materials such as fuels, lubricating oils, hydraulic fluids, glycol-based coolants, lead-acid batteries, solvents, paints, cleaning agents, coatings, and herbicides. Solar facilities could also involve the use of the toxic elemental metal cadmium and dielectric fluids.

Construction, operations, and decommission activities of the solar projects listed in Table 5-2 would involve movement of large amounts of soil materials. Valley Fever is spread through the air and if soil containing the Valley Fever fungus is disturbed by construction, natural disasters, or wind, the fungal spores can be released into the air.

Renewable energy sites may have existing contamination that could pose a risk to workers and the environment during site characterization, construction, operations, and decommissioning. Potential hazardous material impacts from renewable projects listed in Table 5-2 are increased risks of fires, human health impacts, and environmental contamination. This could lead to environmental impacts related to biological resources, surface water, groundwater, air quality, agriculture and grazing, and recreation.

Cumulative impacts resulting from hazardous materials would occur only if oil and gas development anticipated by the 2015 RFD Scenario occurred in the near vicinity to the projects listed in Tables 5-1 and 5-2 and if the projects were under construction at the same time. This includes cumulative impacts due to Valley Fever. Ground disturbance is stabilized after construction, reducing the risk of airborne fungal spores. Assuming some of the oil and gas development anticipated in the 2015 RFD Scenario were drilled in the next 5 years, it would overlap with the projects listed in Tables 5-1 and 5-2 and result in cumulative effects. The effects would be reduced by the BMPs, SOPs, and regulations required for oil and gas drilling on BLM land. These effects would be similar for all alternatives, except Alternative B because the open areas in Alternative B are not sufficiently near the solar projects listed in Tables 5-2 to result in cumulative effects.

5.3.4 Air Quality and Atmospheric Conditions

Cumulative impacts to air quality would result from impacts of the oil and gas development under the 2015 RFD Scenario that combine with impacts of other projects or actions within the CCFO Planning Area. The geographic scope would include the areas of most likely development, which are either in the North Central Coast air basin or in the San Joaquin Valley air basin, including areas impacted by cumulative projects within or near the portions of these air basins that are in the CCFO Planning Area.

As discussed in Section 4.5, new sources of air pollution, including those associated with oil and gas development and other cumulative projects, would require further project- and site-specific analysis by the local air quality management district and for activity on public land, by the BLM. Applicable BMPs, stipulations, and other COAs would be identified and imposed as necessary. Each application for new oil and gas activity would require an assessment of ambient air quality conditions (baseline or existing), National Ambient Air Quality Standards, criteria pollutant nonattainment conditions, and potential air quality impacts of the activity (including cumulative and indirect impacts). This would disclose the potential impacts from temporary or cumulative degradation of air quality to the affected air basin. All cumulative projects would be expected to undergo environmental permitting and would be likely to incorporate mitigation to reduce short-term emissions during construction and long-term emissions for ongoing operations and maintenance. Cumulative project mitigation would likely be similar to mitigation identified in Section 4.5 for oil and gas activity, including measures to control dust, control emissions from equipment, use best available emissions controls on stationary sources, and possibly to offset emission sources.

With BLM's discretionary review of oil and gas development within its administrative area, potential conflicts with other cumulative projects or actions within the Planning Area would be avoided. Cumulative impacts to air quality would be minor.

5.3.5 Climate Change/Greenhouse Gas Emissions

Globally, greenhouse gas (GHG) emissions contribute, by their nature, on a cumulative basis to the adverse environmental impacts of global climate change. Because the primary environmental effect of GHG emissions would be to exacerbate global climate change and the numerous side-effects on the environment and humans, the area of influence for GHG impacts is global. As noted in Section 4.6, the alternatives would result in directly emitted GHG and indirect emissions from end-users of the fuels. Tables 4.6-1 and 4.6-2 in Section 4.6.2 estimate that development and production phase GHG emissions for a full buildout of the 2015 RFD scenario on Federal mineral estate would result in 19,084 metric tons of carbon dioxide equivalent (MTCO2e) annually, which is 0.004 percent of the approximately 459 million metric tons of CO2 equivalent (MMTCO2e) that California emitted in 2013 (ARB, 2015). Table 4.6-3 in Section 4.6.2 provides a rough estimate of potential indirect emissions as 141,062 MTCO2e, 0.03 percent of the approximately 459 MMTCO2e. The GHG emissions and the associated direct and indirect impacts of the project would be minor.

All projects listed in Tables 5-1 and 5-2 would result in direct emissions of GHG over the lifetime of the projects. Some projects, such as the wind and solar projects, would also produce electricity in a manner that avoids the GHG emissions normally associated with power plants over the lifetime of the projects. While each project's GHG emissions would be subject to State climate change programs including California's Cap-and-Trade Program and/or local air quality regulations, any increases in GHG emissions that occur in the CCFO Planning Area would contribute to cumulative increases in global GHG emissions. As noted in Section 3.6, how climate change may impact California is described in the 2009 Biennial Report of the California Climate Action Team (CAT, 2009) and Our Changing Climate 2012 from the California Climate Change Center (CEC, 2012). The effects anticipated in the Central Valley provide an illustration of the potential changes: the number of days conducive to ozone formation in the San Joaquin Valley may rise by 75 to 85 percent by the end of the century; and sea-level rise may place additional pressure on the levee systems and increase the intensity of saltwater intrusion into coastal groundwater resources, leading to increased flooding and decreased freshwater availability (CAT, 2006; CAT, 2009). The California Climate Change Center notes that the agricultural resources of the Salinas Valley are particularly vulnerable (CEC, 2012). Cumulative emissions would contribute to these effects.

5.3.6 Groundwater Resources

The cumulative impact analysis for groundwater resources considers the estimation of future oil and gas well development on Federal mineral estate in the 2015 RFD Scenario, the future oil and gas projects summarized in Table 5-1, and the other applicable cumulative projects summarized in Table 5-2.

If the current development trend continues, 3,150 wells could be initiated in the next 15 years within the CCFO Planning Area and over 99 percent of these would be within the Coalinga, San Ardo, Lynch Canyon, and Jacalitos oil and gas fields (Section 5.2.1). The RFD Scenario assumes that 32 to 37 wells will be developed in the next 15 to 20 years on Federal mineral estate within the CCFO Planning Area, regardless of the chosen alternative. Therefore, only 1 percent of the wells projected for the CCFO Planning Area in the next 15 years might be on Federal mineral estate. As stated in Section 5.2.1, nearly all well development in the last decade occurred in four oil and gas fields: Coalinga, San Ardo, Lynch Canyon, and Jacalitos. If the 32 wells expected to be drilled within existing oil and gas fields are within these four oil and gas fields, then two groundwater subbasins — Westside subbasin (CDWR basin number 5-22.09), which intersects a small portion of the Coalinga field, and Paso Robles Area subbasin (3-4.06), which intersects a portion of the San Ardo field — may be particularly vulnerable to impacts

(see Figure 7.3-3). Both of these subbasins are critically overdrafted basins (DCWR, 2015b) and have been assigned a CASGEM high-priority ranking for the CASGEM basin prioritization program (CDWR, 2014a). However, as stated in Section 4.7.2, BLM regulations, the DOGGR regulations, mitigation measures provided in the Final EIR, and the BLM final rule collectively serve to reduce any potential impacts to the quantity or quality of usable groundwater.

In addition to the well development projected in the RFD Scenario, there are other future projects in the CCFO Planning Area. There is one cumulative future oil and gas exploration and development projects within the CCFO Planning Area (Table 5-1). The Phillips 66 Propane Recovery Project in Contra Costa County involves a modification to the existing refinery to recover butane and propane from refinery fuel gas. The Phillips 66 Refinery, however, is in northwestern Contra Costa County and is not located on Federal mineral estate. Other applicable cumulative projects in the CCFO Planning Area include mostly mining projects, with some alternative energy projects (solar and wind), quarry projects, a dredge tailings removal project, and a concrete plant (Table 5-2). Based on the nature of the cumulative projects, a cumulative impact on groundwater quality is not expected. But, because the amount of water necessary for each of the cumulative projects is not known, there is the potential that these projects could have a cumulative impact on groundwater quantity. In addition to these cumulative projects, future municipal and industrial growth, along with the ongoing water demands of existing agriculture, will add additional pressure to the increasing water demand.

As stated in Section 4.7, water quantity impacts depend on local conditions, and therefore, require a site-specific analysis (CCST, 2014). The volumes of water are often less important than the rates and timing of the withdrawals (CCA, 2014). There is uncertainty associated with the amount of water needed for future well stimulation treatments, the amount of water needed for future cumulative projects, and the amount of water available due to the recent extreme drought in California. The average water use for hydraulic fracturing in California is small (140,000 gallons per well or 0.4 AF/well) when compared to the overall water use in most of the California basins. In addition, the average water use per well is similar to the average annual water use of one household in California (153,000 gallons) (CCST, 2015a). Nonetheless, recognizing the pressure placed on scarce water resources during the ongoing California drought, it is reasonable to assume that any increase in groundwater use could result in a cumulative adverse effect on groundwater quantity, especially in a basin already subject to overdraft.

5.3.7 Surface Water Resources

The cumulative geographic scope for surface water resources is the entire CCFO Planning Area.

Cumulative effects to surface water quality could occur if disturbed soils or spills or disposal of potentially harmful materials used during construction occurred during oil and gas drilling and combined with disturbed soils or spills from the cumulative projects listed in Tables 5-1 and 5-2. Most projects listed in Tables 5-1 and 5-2 are sufficiently far from the open areas for all alternatives that it is unlikely that any simultaneous spill would impact the same water feature and any cumulative effects would be expected to be minor and short-term.

Cumulative effects to flooding are expected to be minimal because all of the projects listed in Tables 5-1 and 5-2 are expected to have few new permanent structures or impervious surfaces. This combined with the effects of the oil and gas development would result in minor cumulative effects to flooding.

As noted in Section 5.3.6, Groundwater Resources, cumulative effects to water use and supply depends on local conditions, and therefore, require a site-specific analysis (CCST, 2014). There is uncertainty associated with the amount of water needed for future well stimulation treatments, the amount of water needed for future cumulative projects, and the amount of water available due to the recent extreme drought in California. Recognizing the pressure placed on scarce water resources during the ongoing California drought, it is reasonable to assume that any increase in water use could result in a cumulative adverse effect on water use and supply.

5.3.8 Soil Resources

The geographic area considered for cumulative effects related to soils is within a 0.5-mile radius of the open areas within each alternative. This is because impacts resulting from erosion are localized in nature and are unlikely to extend beyond the actual project boundaries unless an extreme event results in substantial downstream erosion.

The only cumulative project that is close enough to potential development in the open areas for each alternative is the Stonewall Quarry. While any disturbance to surface soils could expose soils to the effects of wind and water and result in erosion, the anticipated ground disturbance for the up to 37 wells, 206 acres, combined with the 53 acres of potential ground disturbance from the Quarry would have only a minor potential to result in a cumulative effect. Standard BMPs required for both the oil and gas development as well as standard BMPs required for mining activities would reduce the effects of any potential cumulative soil erosion such that the overall cumulative impact would be minor.

5.3.9 Biological Resources – Vegetation

The cumulative impact analysis for biological resources is bounded by the timeframe, geographic scope, and analytical assumptions. The timeframe is discussed in Section 5.1.2. The geographic scope for analysis of cumulative effects on biological resources is the Planning Area. The analytic assumptions are that other Federal and State agencies with a stake in the Planning Area will continue to implement their current plans as written. It is further assumed that private lands within the Planning Area would continue to exhibit the same overall spatial pattern and trends of vegetation, habitat, and disturbance over time as presently exists.

Biological resources are primarily subject to degradation from human activities, including surface disturbance. Historically, the CCFO Planning Area has been subject to human disturbances that have resulted from agriculture, grazing, development, and recreational use. These trends in disturbance are expected to continue accumulating a net loss of these resources.

Cumulatively, these historic trends of adverse impacts result from private, local, State, and Federal actions within the Planning Area. To counter these adverse impacts, agencies with a preservation or protection mandate, such as BLM, plan for and implement actions to mitigate these trends (e.g., habitat conservation plans and species recovery plans). The actions provided for by the BLM through this RMPA add to the protections of biological resources through the support, compliance with, and enhancement of these efforts. However, there is a limited amount of land within the CCFO Planning Area under BLM management.

Cumulative impacts directly relate to the management of the biological resources in the Planning Area. The RMP FEIS (BLM, 2006) discusses BLM management of livestock grazing, wildland fire and fuels management, recreation, and other activities, and provides an analysis of cumulative impacts of management actions. The RMP FEIS concludes that the RMP would result in generally moderate levels of cumulative impacts and localized, high-impact activities occurring as a result of BLM management actions are expected to be relatively minimal. Therefore, cumulative impacts are not expected to be extensive under the RMP (BLM, 2006). As discussed below, the additional cumulative impact of oil and gas leasing under the RMPA would be minor.

Vegetation and Habitat Impacts

Section 4.10 describes potential impacts to native vegetation and habitat from oil and gas development in the Planning Area. Oil and gas development, as well as other current and probable future projects in the Planning Area (Section 5.2), would contribute to cumulative direct and indirect impacts to vegetation and habitat.

Oil and gas development in the Planning Area has the potential to result in short-term and temporary and long-term and permanent adverse impacts on biological resources that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Site-specific analysis would be required to determine actual impacts.

Oil and gas development on BLM land and split estate would be mainly in existing well fields. New development in common vegetation communities that do not support special status species would result in minor impacts to vegetation and habitat. However, valuable native habitat is found within some existing oil and gas fields, where future effects of oil and gas development could contribute to cumulatively considerable impacts.

Site-specific analysis and implementation of lease stipulations, BMPs, SOPs, and additional mitigation as presented in Section 4.10 would reduce impacts and minimize the incremental contribution to cumulative effects from each oil and gas development lease.

Generally, the context and intensity of non-BLM activities are not anticipated to vary by alternative because these activities do not directly depend on BLM management actions and allowable uses set forth in the RMPA alternatives; however, oil and gas development will somewhat depend upon BLM management.

As discussed in the RMP FEIS (BLM, 2006), much of the BLM management in these alternatives is designed to protect and preserve biological resources. However, there is a very limited amount of land within the Planning Area under BLM management. Therefore, BLM management makes a relatively small contribution to cumulative effects, both adverse and beneficial, throughout the Planning Area.

Alternative A is the No Action Alternative. The No Action Alternative would continue the current management goals, objectives, and direction as specified in the 2007 Hollister Field Office RMP. See Section 4.10.3. The impacts and cumulative effects of Alternative A on biological resources would be identical to existing conditions.

Under Alternative B, lands within oil and gas fields and a 0.5-mile buffer area would be open and all other areas would be closed. All lands open to leasing would have a Controlled Surface Use (CSU) stipulation. See Section 4.10.4. The impacts and cumulative effects of Alternative B on biological resources are likely to be substantially reduced from existing conditions (i.e., the No Action Alternative) due to limitations on the locations of future wells.

Depending on where new oil and gas leases are located, the impacts and cumulative effects of Alternative C on biological resources are likely to be reduced from existing conditions (i.e., the No Action Alternative) but greater than Alternative B. Cumulative effects of Alternative D on biological resources are likely to be considerably reduced from existing conditions (i.e., the No Action Alternative), and somewhat reduced from Alternative C, but greater than Alternative B. Cumulative effects of Alternative E on biological resources are likely to be reduced from existing conditions (i.e., the No Action Alternative), but may be similar to or greater than Alternatives B, C, and D.

Overall, each alternative would contribute incrementally to cumulative impacts. Most impacts would be avoided and minimized through implementation of lease stipulations, BMPs, and SOPs, and additional mitigation as described in Section 4.10, and the net cumulative effect of oil and gas leasing on BLM-managed lands would be minor.

5.3.10 Biological Resources – Wildlife Habitat

Introductory information in Section 5.3.9 would also apply to Wildlife Habitat.

Section 4.11 describes potential impacts to wildlife and habitat from oil and gas development in the Planning Area. Oil and gas development, as well as other current and probable future projects in the Planning Area (Section 5.2), would contribute to cumulative direct and indirect impacts to wildlife and habitat.

Oil and gas development in the Planning Area has the potential to result in short-term and temporary and long-term and permanent adverse impacts on biological resources that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Site-specific analysis would be required to determine actual impacts.

Oil and gas development on BLM land and split estate would be mainly in existing well fields. New development in common vegetation communities that do not support special-status species would result in minor impacts to wildlife and habitat. However, valuable native habitat is found within some existing oil and gas fields, where future effects of oil and gas development could contribute to cumulatively considerable impacts.

Site-specific analysis and implementation of lease stipulations, BMPs, SOPs, and additional mitigation as presented in Section 4.11 would reduce impacts and minimize the incremental contribution to cumulative effects from each oil and gas development lease.

The alternatives analysis in Section 5.3.9 would also apply to Wildlife Habitat. Overall, each alternative would contribute incrementally to cumulative impacts. Most impacts would be avoided and minimized through implementation of lease stipulations, BMPs, and SOPs, and additional mitigation as described in Section 4.11, and the net cumulative effect of oil and gas leasing on BLM-managed lands would be minor.

5.3.11 Biological Resources – Special Status Species

Introductory information in Section 5.3.9 would also apply to Special Status Species.

Section 4.12 describes potential impacts to special status species from oil and gas development in the Planning Area. Oil and gas development, as well as other current and probable future projects in the Planning Area (Section 5.2), would contribute to cumulative direct and indirect impacts to special status species.

Oil and gas development in the Planning Area has the potential to result in short-term and temporary and long-term and permanent adverse impacts on biological resources that could range from negligible to major depending on the extent and locations of surface disturbance for exploration and development. Site-specific analysis would be required to determine actual impacts.

Oil and gas development on BLM land and split estate would be mainly in existing well fields. New development in common vegetation communities that generally do not support special status species would result in negligible or no impacts to special status species. However, valuable native habitat that may support special status species is found within some existing oil and gas fields, where future effects of oil and gas development could contribute to cumulatively considerable impacts.

Site-specific analysis and implementation of lease stipulations, BMPs, SOPs, and additional mitigation as presented in Section 4.12 would reduce impacts and minimize the incremental contribution to cumulative effects from each oil and gas development lease.

The alternatives analysis in Section 5.3.9 would also apply to Special Status Species. Overall, each alternative would contribute incrementally to cumulative impacts. Most impacts would be avoided and minimized through implementation of lease stipulations, BMPs, and SOPs, and additional mitigation as described in Section 4.12, and the net cumulative effect of oil and gas leasing on BLM-managed lands would be minor.

5.3.12 Visual Resource Management

The geographic scope for cumulative visual impacts is limited to land areas within the viewshed of potential CCFO Planning Area oil and gas lease lands designated VRM Class I, II, and/or III. Lands visible from potential CCFO Planning Area oil and gas lease lands designated VRM Class IV need not be considered because the VRM Class IV management objective allows for a high level of visual change. As a

result, cumulative actions in combination with potential CCFO Planning Area oil and gas leasing would not be expected to result in inconsistencies with the VRM Class IV management objective.

Because the cumulative analysis is limited to VRM Class I through III viewsheds, only the potential CCFO Planning Area oil and gas lease lands in the southern half of the Planning Area are analyzed. The very few BLM-managed public lands in the northern area (north of Hollister) are not analyzed because they are designated VRM Class IV. Furthermore, cumulative actions located outside the Planning Area are also not analyzed because they are at least 15 miles from the eastern boundary of the Planning Area (i.e., where VRM Class I, II, and/or III areas are located) and would not be visibly discernible.

Consequently, there are only five projects, along with potential CCFO Planning Area oil and gas lease lands, within the effective geographic scope for cumulative visual impacts, which is the southern half of the CCFO Planning Area. One of these projects (Stonewall Quarry), however, is also eliminated from analysis because it would be screened from view by intervening terrain. Therefore, four projects remain and are analyzed below including two oil and gas projects in Coalinga, Fresno County (Table 5-1), the California Flats Solar Project in Monterey County, and the Solargen Panoche Valley Solar Project in San Benito County (Table 5-2).

Cumulative impacts on visual resources from the projects considered in this analysis could occur from surface disturbance, combustion emissions and fugitive dust that alter visibility, and the introduction of man-made elements that change the landscape character. These changes could alter visible landscape form, line, color, and texture, and cause visual contrast. The cumulative effects of these changes on BLM-managed lands could degrade the visual quality of the overall landscape in the Planning Area and could be inconsistent with the objectives of VRM classes designated in the Planning Area. The degree of impact depends on the visibility of the projects and the VRM classes of the particular BLM-managed areas affected by the projects.

Under Alternatives A, C, D, and E of this Draft RMPA/EIS, all four of the cumulative projects could potentially be located in the same field of view as the oil and gas leases depending on where the leasing and development occurs.

Under Alternative B, only the two oil and gas projects in Coalinga, Fresno County could be located in the same field of view as potential Alternative B oil and gas leases depending on where that leasing and development occurs. Under Alternative B, areas in the potential field of view of the California Flats Solar Project and Solargen Panoche Valley Solar Project would be closed to oil and gas leasing.

The two oil and gas leases in Fresno County occur on BLM-managed lands located in areas designated as VRM Class IV. Since the Class IV objective allows for major modification to the existing character of the landscape, these leases, in conjunction with any leases associated with any of the Alternatives A through E would likely be consistent with the Class IV objective.

The remaining two cumulative projects (California Flats Solar and Panoche Valley Solar) would occur on private lands not managed by the BLM; these projects would contribute to landscape changes in the Planning Area that may adversely affect the visual quality of nearby BLM-managed public lands.

The **California Flats Solar Project,** however, and any leases associated with Alternatives A, C, D, and E, would only be located in the field of view of BLM-managed lands designated as VRM Class IV (areas near this solar project would be closed to leasing under Alternative B). Since the Class IV objective allows for major modification to the landscape that can dominate the view and be the major focus of viewers' attention, this solar project, in conjunction with any leases associated with Alternatives A, C, D and E, would likely be consistent with the VRM Class IV objective.

The **Solargen Panoche Valley Solar Project** would occur on private land in a valley between the Panoche Hills and Griswold-Tumey Hills areas that are BLM-managed lands designated as VRM Class III. The

VRM Class III objective is to partially retain the existing character of the landscape and allow for a moderate (or lower) level of change. The change may attract the attention of the casual observer but should not dominate the view. This solar project, in conjunction with any leases associated with Alternatives A, C, D, and E and their close proximity to these VRM Class III areas, could attract attention and/or dominate the views of some observers on or near the hills and slopes closest to the valley resulting in an adverse, cumulative visual impact that could be inconsistent with the VRM Class III objective. Under Alternative B, areas in proximity to the Solargen Panoche Valley Solar Project would be closed to oil and gas leasing, so Alternative B would not contribute to cumulative visual impacts in this field of view.

The Panoche Hills area also contains the Panoche Hills Wilderness Study Area (WSA) designated as VRM Class I. The VRM Class I objective is to preserve the existing character of the landscape and allow only a very low level of change that must not attract attention. The Solargen Panoche Valley Solar Project, itself, would barely be discernible from the WSA due to very limited visibility and brief viewing opportunities. A limited number of power blocks could briefly be visible; they would appear as a sliver of darker shading against the lighter valley floor and would not be substantially noticeable given the viewing distance and screening by intervening landforms (Aspen Environmental Group, 2010). The Solargen Panoche Valley Solar Project, in conjunction with any leases associated with Alternatives A, C, D, and E, however, has the potential to result in a cumulative level of change to the landscape that is greater than that allowed under VRM Class I, which could result in an adverse, cumulative visual impact that would likely be inconsistent with the VRM Class I objective. Under Alternative B, areas in proximity to the Solargen Panoche Valley Solar Project would be closed to oil and gas leasing, so Alternative B would not contribute to cumulative visual impacts in this field of view.

In summary, Alternatives A, C, D, and E, in conjunction with the Solargen Panoche Valley Solar Project, may have cumulatively adverse visual impacts that could be inconsistent with VRM Class I and III objectives. The types of mitigation that could be implemented to lessen the degree of these impacts are presented at the end of Section 4.13.3. Under Alternative B, lease areas within or near the cumulative projects would be closed to oil and gas leasing; therefore, Alternative B would not contribute to cumulative visual impacts in the respective fields of view.

5.3.13 Special Management Areas

Cumulative impacts to SMAs would occur when impacts of the Proposed RMPA are combined with impacts from other projects or actions within the Planning Area. The special designation Planning Area for this RMPA/EIS is defined as the SMAs within the CCFO administrative boundary that are managed by the BLM.

Oil and gas development and its associated demand for land use authorizations within the Planning Area would continue to be limited by the protected status of Wilderness Areas, WSAs, national monuments, ACECs and RNAs, and other areas that contain management prescriptions (see Section 3.14). For special designation areas that would be open to leasing under the Proposed RMPA, lease stipulations (i.e., NSO, CSU, or Timing Limitations) are recommended to avoid or reduce impacts to SMAs (see Sections 4.14.3 through 4.14.7). With implementation of these stipulations on future oil and gas development, the Proposed RMPA would have negligible impacts on SMAs, and would not combine with present or future projects to create a cumulative effect.

5.3.14 Cultural and Heritage Resources

Cumulative effects on archaeological sites, traditional cultural properties, and historic resources are caused by impacts (both mitigated and non-mitigated) that can occur over a long period of time, resulting in the gradual but permanent loss of archaeological data as well as the diverse cultural history represented by those properties. In this sense, cumulative losses of cultural resources within the CCFO Planning Area also have the potential to indirectly affect Native American groups and various other populations with a

history of settlement and land use in the region. Specific site types that embody this culture history are prehistoric habitation and resource procurement sites, rock art, sacred sites, mission-related sites, and historic ranching, mining, and agricultural sites. While impacts on historic properties may be considered "mitigated" by the retrieval of scientific data from archaeological sites or by the recovery of historical data present in built resources (e.g., buildings, structures, landscapes), the cultural heritage represented by these sites is a non-renewable resource whose loss cannot be mitigated and thus constitutes a major and unavoidable cumulative impact. Cumulative losses to the cultural heritage of specific groups or populations may also be considered an off-site effect.

While cumulative effects on cultural resources are difficult to predict given the limited data currently available concerning cultural resources in the Planning Area, increased or strengthened management programs for the protection and long-term preservation of historic properties will ultimately prevent major cumulative effects from occurring. For all of the alternatives, there are possible cumulative effects to prehistoric and historic resources in areas that receive increased use from potential ground-disturbing activities such as those listed in Tables 5-1 and 5-2. Some projects listed in Tables 5-1 and 5-2 would require many acres of ground disturbance such as the solar PV projects. Cumulative adverse effects include the physical destruction of all or part of the resource; these resource types and areas will require more intensive management and mitigation measures by BLM as land use demands rise. These demands could be potential uses for energy and mineral, grazing, transportation, recreation, and other approved land use authorizations through time. Additionally, potential cumulative effects from increased public awareness of cultural resources increase the risk of vandalism or theft. These cumulative impacts cannot easily be measured; but over time, these activities could permanently impact resources, resulting in an irretrievable loss of non-renewable resources and information.

5.3.15 Paleontological Resources

The geographic extent of cumulative analysis for paleontological resources encompasses the 12 counties within the boundary of the CCFO Planning Area. This wide geographic scope is appropriate because it is likely that paleontological resources similar to those described under each alternative are present throughout this area and unknown, previously unrecorded paleontological resources could be uncovered within sensitive geologic units within the geographic area of cumulative effect. Cumulative impacts to paleontological resources will persist as long as ground-disturbing activities occur within the geographic extent of cumulative analysis for paleontological resources. Should paleontological resources be discovered during construction-related activities associated with the current and future projects, they would be subject to the applicable laws and regulations discussed in Section 3.16.2, which afford specific protections to discovered paleontological resources.

With regard to paleontological resources, those cumulative projects that directly result in ground disturbances are most likely to adversely affect paleontological resources. Power transmission and energy development projects, utility improvements, transportation projects, landfill projects, and commercial and residential projects have previously affected paleontological resources in San Mateo, San Francisco, Santa Cruz, Santa Clara, Stanislaus, Alameda, Contra Costa, San Joaquin, Monterey, San Benito, Merced, and Fresno Counties. The destruction of non-renewable paleontological resources as a result of project-related ground disturbances have the potential to cause the permanent loss of scientific information, thus resulting in an adverse cumulative impact over time. The implementation of management actions and mitigation measures during construction has resulted in the recovery and curation of fossil remains that may otherwise have been destroyed. Many of the recovered specimens have been made available for academic or institutional research, thereby aiding in scientific discovery.

As described in Table 5-1 and Table 5-2, there are numerous projects considered in this cumulative impact analysis. The actual number and type of paleontological resources that might be adversely affected by these projects cannot be determined without a comprehensive inventory and assessment of the paleontological resource potential for each oil and gas lease in the CCFO Planning Area, which is beyond the reasonable

scope of this EIS. Typically, the paleontological resource potential of a given project area is identified as part of the permitting process for individual undertakings, and paleontological resources are discovered during ground-disturbing activities related to project development.

Unknown, previously unrecorded paleontological resources could be found at nearly any development site within the CCFO Planning Area. As described above, projects that directly result in ground disturbances are most likely to adversely affect paleontological resources. In the CCFO Planning Area, those projects would include wind and solar farm developments, mining and quarry expansions, and conventional energy generation projects. In addition, according to the 2015 RFD Scenario, future oil and gas activity in the CCFO Planning Area is most likely to occur within geologic units with moderate to high paleontological sensitivity, which would have the potential to cause an adverse effect to fossil resources. Should paleontological resources be discovered on BLM-administered public lands during construction-related activities associated with the current and future projects, they would be subject to legal requirements designed to protect them similar to the BLM Mitigation and Management Actions described in Section 4.16, thereby reducing the effects of impacts. Therefore, the potential impacts of the CCFO Planning Area RMPA/EIS, when combined with impacts from past, present, and reasonably foreseeable projects would be reduced to an acceptable level with mitigation incorporated.

5.3.16 Social and Economic Conditions

The geographic scope for cumulative impacts would be the entire CCFO Planning Area. Effects would likely be county specific because local jurisdictions or districts provide public services and utilities, and the regional labor force would be expected to come primarily from counties within the Planning Area and from neighboring counties.

Construction of cumulative projects listed in Tables 5-1 and 5-2 may bring workers to the communities proximate to and serving individual project locations. This type of temporary growth should be expected for construction of large utility-scale projects that typically require large numbers of workers, many of whom have specialized skills. However, given the existing vacancy rates and projected population growth within the regional study area (refer to Table 3.17-1), any increases to housing demand and population from the 2015 RFD Scenario is expected to have a minor cumulative contribution to the available supply and projected growth.

While some degree of social disruption is likely to accompany cumulative short-term construction worker in-migration (particularly if a number of large-scale projects are built simultaneously within the same localized area), it is difficult to predict the extent to which specific communities are likely to be affected, which population groups within each community are likely to be most affected, and the extent to which social disruption is likely to persist beyond facility construction. This is because such a cumulative impact would be highly dependent on projects having overlapping construction time frames. Should cumulative project development result in a recognizable scale of temporary construction worker relocations to local communities, regardless of the amount the 2015 RFD Scenario well development contributes within these localized communities, some social change is expected to occur cumulatively but is considered to be minor.

Beneficial economic impacts would occur from the development of cumulative projects identified in Tables 5-1 and 5-2. Workforce wages and spending during the construction and operation of cumulative projects would be an economic stimulator to regional and local governments. Other important public benefits include both short-term and long-term increases in local expenditures, payrolls, and sales tax revenues. These would positively affect the economy at regional and local levels. The development of cumulative industrial projects may adversely affect environmental amenities including environmental quality, stable rural community values, and cultural values. The development of cumulative mineral extraction projects could reduce a community's ability to attract some new types of businesses. However, other economic and demographic factors would play a role in the economic development potential of any particular location.

With respect to environmental justice, the communities of King City, San Ardo, and San Lucas contain exceptionally high concentrations of minority population, with San Lucas also containing a very high percentage of low-income population. However, when reviewing the locations of cumulative projects identified in Tables 5-1 and 5-1, these areas do not show a disproportionate amount of cumulative projects occurring. Because some of the cumulative projects listed in Table 5-1 would be located in the same local areas containing a disproportionate amount of minority and low-income populations, these projects could contribute toward impacts disproportionately borne by minority or low-income populations. However, as discussed in Section 4.17, given the small number of new wells (up to 37) and land disturbed (up to 206 acres), the 2015 RFD Scenario would have a negligible contribution toward cumulative disproportionate adverse environmental impacts within the communities of King City, San Ardo, and San Lucas.

5.3.17 Transportation and Access

Construction of cumulative projects listed in Tables 5-1 and 5-2 would generate traffic on roadways and within communities proximate to and serving individual project locations. The greatest number of trips would be expected during construction of large utility-scale projects that typically require large numbers of workers and daily truck trips. Any adverse cumulative impact from increased daily trips may be most noticeable on rural roadways with low baseline traffic volumes. However, because these roadways have low existing traffic volumes, an increase in traffic volumes may not have adverse effects in the performance of the circulation system. The trips generated due to 2015 RFD Scenario activities would be negligible in terms of traffic volumes on the roadways serving the development of 37 wells over the next 15-20 years. Moreover, most of these trips would be temporary in nature. Therefore, vehicle trips from 2015 RFD Scenario activities would have a minor to negligible cumulative contribution to the performance of the circulation system.

When reviewing the cumulative projects that may affect the area where 2015 RFD Scenario activities are expected to occur (BLM-administered lands in Fresno, Monterey, and San Benito Counties within the area of high oil and gas occurrence potential, shown in Figure 5-1); only the projects identified in Table 5-1 could result in cumulative access impacts. As discussed in Section 4.18 (Transportation and Access), all future projects on BLM-administered lands would require further project- and site-specific environmental analysis, during which time applicable BMPs, stipulations, and other measures would be identified and imposed to reduce adverse effects to existing BLM transportation routes or access points. Furthermore, Mitigation Measure TR-1 is proposed to directly mitigate any adverse disruption effects to existing BLM travel routes or access points within the CCFO Planning Area from oil and gas development under the 2015 RFD Scenario for Alternatives B through E. With BLM's discretionary review of oil and gas development on Federal mineral estate, conflicts between the 2015 RFD Scenario activities, other projects or actions within BLM lands, and the management of existing transportation routes and access to BLM lands would be avoided. Cumulative access impacts would be negligible.

5.3.18 Lands and Realty

Cumulative impacts to the BLM's lands and realty program would result from other projects or activities that combine with the impacts of the Proposed RMPA to affect the BLM's ability to authorize land uses in the Planning Area. The Planning Area for lands and realty is defined as the BLM-administered surface land within the CCFO Planning Area administrative boundary, as well as the BLM-administered subsurface mineral estate underlying privately owned lands within the CCFO Planning Area (i.e., split estate).

Cumulative projects that may affect the Planning Area have been identified in Tables 5-1 and 5-2. As discussed in Section 4.19 (Lands and Realty), all Applications for Permits to Drill subject to BLM approval would require further future project- and site-specific analysis, during which time applicable BMPs, stipulations, and other COAs would be identified and imposed on the proposed leases. With BLM's discretionary review of oil and gas development on Federal mineral estate, conflicts between energy-related actions and other projects or actions within the Planning Area would be avoided. Cumulative impacts to existing land uses and future land use authorizations would not occur.

5.3.19 Utility Corridors and Communication Sites

Cumulative impacts to utility corridors and communication sites would result from impacts of the Proposed RMPA that combine with impacts of other projects or actions within the Planning Area. The utility corridor Planning Area for this RMPA/EIS is defined as oil and gas pipelines, transmission lines, and communication sites within the CCFO Planning Area.

The collective effects on utility corridors and communication sites are interrelated with various energy-related growth activities in the Planning Area. Increased demand for oil and gas development would increase the use of existing ROW corridors, as well as require the construction of new ancillary facilities such as pipelines and connectors, compressor stations, or transmission tie-ins. As discussed in Sections 4.20.3 through 4.20.7, new utility facilities associated with oil and gas development would require further project- and site-specific analysis by the BLM, during which time applicable BMPs, stipulations, and other COAs would be identified and imposed as necessary. With BLM's discretionary review of oil and gas development within its administrative area, potential conflicts with other cumulative projects or actions within the Planning Area would be avoided. Cumulative impacts associated with utility corridors and communication sites would not occur.

5.3.20 Wild and Scenic Rivers

Cumulative impacts to National Wild and Scenic Rivers (NWSRs) would result from impacts of the Proposed RMPA that combine with impacts of other projects or actions within the Planning Area. The NWSR Planning Area for this RMPA/EIS is defined as eligible river segments within the CCFO Planning Area. Designated NWSRs would not cross or be located in the vicinity of Federal mineral estate, and as such would not be affected by the Proposed RMPA.

Oil and gas development and its associated demand for land use authorizations within the Planning Area would continue to be limited by the protected status and management prescriptions required for eligible and NWSRs (see Section 3.21). For eligible river segments that would be open to leasing under the Proposed RMPA, lease stipulations (i.e., NSO or CSU) are recommended to avoid or reduce impacts to NWSRs (see Sections 4.21.3 through 4.21.7). With implementation of these stipulations on future oil and gas development, the Proposed RMPA would have negligible impacts on NWSRs. The BLM would also implement management direction through project-level decisionmaking to avoid impacts to river values from other proposed or future projects, as required by BLM Manual 6400. With BLM's discretionary review and approval of future proposed actions near eligible NWSRs, the Proposed RMPA would not combine with other existing or future projects to create a cumulative effect.

Chapter 6

Consultation and Coordination

Chapter 5
Consultation and Coordination

6. Consultation and Coordination

6.1 Introduction

This document has been prepared with input from interested agencies, organizations, and individuals. Public involvement is a vital component of the Resource Management Planning (RMP) process and Environmental Impact Statement (EIS) preparation for vesting the public in the effort and allowing for full environmental disclosure. Guidance for implementing public involvement is codified in 40 Code of Federal Regulations (CFR) 1506.6 and 43 CFR 1610, thereby ensuring that the BLM makes a diligent effort to involve the public in the preparation of RMPs EISs. Public involvement for the Central Coast RMP is being conducted in two phases, as follows:

- Public scoping prior to National Environmental Policy Act (NEPA) analysis to obtain public input on issues, the scope of the analysis, and to develop the proposed alternatives, and
- Public review and comment on the Draft RMP/EIS, which includes analyzing possible environmental impacts and identifying the final preferred alternative.

A summary of public involvement during the Central Coast RMPA planning process is presented in Section 6.2.

6.2 Outreach

6.2.1 Notice of Intent/Notice of Availability

BLM published the Notice of Intent (NOI) to Prepare a Resource Management Plan Amendment (RMPA) and EIS for Oil and Gas Leasing and Development in the *Federal Register* on August 5, 2013.

BLM published the Notice of Availability (NOA) for the Central Coast Draft RMPA and Draft EIS in the *Federal Register*. The NOA marked the beginning of a 90-day public comment period.

6.2.2 Advertisements and Announcements

BLM published a news release on the California State Office website announcing start of the planning review of oil and gas development on public lands managed by the CCFO on August 2, 2013. The BLM published the legal notice in the following local newspapers: *San Benito Today*, the *Monterey Herald*, the *Fresno Bee*, and the *Sacramento Bee*.

6.2.3 BLM Website

The BLM also maintains a website (www.blm.gov/ca/eis-og) to inform public land visitors about upcoming events, activities, and planning information. It is commonly used to announce the availability of environmental review documents, including the Draft RMPA and Draft EIS for Central Coast Oil and Gas Leasing and Development. The website provides background information about the project, Citizen's Guide to NEPA, *Federal Register* NOI, all public scoping handouts, news releases, and a downloadable version of the Draft RMPA/EIS, announcements of upcoming meetings, plus an opportunity for people to e-mail comments directly to the BLM office.

6.2.4 Public Meetings

6.2.4.1 Scoping Meetings

Four public scoping workshops were held in January and February 2014 to initiate the public involvement process for the Central Coast RMPA. Each meeting included a PowerPoint presentation to provide context for the proposed project and an information package that included materials to introduce the concept of "scoping," the Central Coast RMPA, background regarding the project, a Comment Sheet, and a map package. The public scoping meetings were held at:

- Hollister, California, at the San Juan Oaks Golf Course, January 29, 2014;
- Sacramento, California, at the Doubletree Hotel, February 4, 2014;
- Salinas, California, at the Cesar Chavez Library, February 11, 2014; and
- Coalinga, California, at the Harris Ranch Inn & Restaurant, February 12, 2014.

BLM's official scoping comment period began August 5, 2013, with the publication of the NOI in the *Federal Register*. The comment period ran for 207 days ending on February 28, 2014 to incorporate the comments received during the public scoping workshops. BLM received 132 unique written responses to the NOI for the Central Coast RMPA/EIS. This included a letter from the non-governmental organization CREDO that included 10,577 electronic signatories and a form letter from three individuals. Members of the general public provided 110 written submissions, organizations or non-profit groups submitted 13 comments, and businesses submitted 2 comments. Federal agencies submitted 2 comments, local government agencies submitted 4 comments, and tribal individuals and organizations submitted 1 written comment.

6.2.4.2 Socioeconomic Workshop

A social and economic strategies workshop was held to provide an opportunity for local government officials, community leaders, and other citizens to discuss regional economic conditions, trends, and strategies with BLM managers and staff. The workshops assisted in identifying the ways public land resources are integrated into the local economy and way of life and in identifying opportunities for collaborative, stewardship-based management proposals. The workshop also devoted some time to introducing participants to economic concepts, the sources of economic data, the data itself, and the processes of economic analysis. The workshop was held in the Carpenter's Hall, Marina in Monterey County on February 4, 2015.

There were 11 attendees at the workshop, including local agency representatives, oil and gas industry representatives, and members of the general public. Information obtained at these meetings is included in the social and economic analysis of the RMP/EIS (Sections 3.17 and 4.17) and elsewhere as appropriate.

6.2.5 Regulatory Required Consultation

6.2.5.1 U.S. Fish and Wildlife Service

Previous formal consultations with the USFWS were conducted for the 2007 Hollister RMP/EIS with a Biological Opinion (BO) issued in 2007. This BO would cover this RMPA/EIS. Additional consultation with the USFWS regarding the RMPA/EIS is ongoing.

6.2.5.2 Native American Tribes

The BLM has initiated Section 106 of the National Historic Preservation Act of 1966 consultation with the 28 tribal individuals, organizations, and federally recognized tribes identified as having interests in the planning area. Consultation conducted as required by the National Historic Preservation Act and Executive Order 13007 "Indian Sacred Sites." During scoping, the first EIS update was mailed to 28 tribal individuals and organizations. Consultation efforts also included the distribution of consultation letters mailed to 28 tribal entities on January 15, 2014. In some cases a letter was sent to multiple individuals belonging to the same tribal organization:

- Amah Mutsun Ohlene
- Amah Mutsun Tribal Band
- California Valley Miwok Tribe
- Costanoan Rumsen Carmel Tribe
- Esselen Tribe of Monterey County
- Mr. Andrew Galvan
- Ms. Judith Bomar Grindstaff
- Ms. Ann Marie Sayers of Indian Canyon
- Ms. Jakki Kehl
- Mr. Richard Larios
- Muwekma Ohlone Tribe
- Ohlene-Costanoan Esselen Nation
- Pajaro Valley Ohlone Indian Council
- Ms. Katherine Erolinda Perez
- Salinan Nation Cultural Preservation Association
- Salinan Nation
- Salinan Tribe of Monterey, San Luis Obispo, and San Benito Counties
- Santa Rosa Rancheria of Tachi Yokuts
- Trina Marina Ruano Family
- Xolon Salinan Tribe
- Ms. Linda Yamane

Of the tribes contacted, the Ohlone/Costanoan-Esselen Nation responded with a letter indicating a desire for consultation on any planned projects that may adversely impact known or predicted cultural resources and sacred sites within the tribe's aboriginal territory.

No other written comments were received from tribal agencies during the scoping period. Government-to-government consultation will continue throughout the RMP amendment process to ensure that the concerns of tribal groups are considered in development of the RMPA.

6.2.6 Other Outreach and Consultation

6.2.6.1 Federal, State, and Local Governments

The BLM sent letters to 35 Federal, State, and local agencies inviting them to be cooperating agencies for the project; however, none of the agencies accepted this invitation. The public scoping process provided opportunities for Federal, State, and local agencies to express their comments and provided meaningful input to the process. During scoping, the BLM received written submissions from two Federal agencies, the National Park Service and the U.S. Environmental Protection Agency, and four written submissions from local agencies, Kern County, Monterey County, San Joaquin Valley Air Pollution Control District, and Stanislaus County.

Through the Memorandum of Understanding among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process, the BLM is consulting with the EPA, National Park Service, and the Fish and Wildlife Service. The BLM also invited the Forest Service to participate and is waiting for their response. The agencies will use a collaborative approach to analyze the potential air quality impacts of proposed oil and gas activities in the Decision Area.

6.2.6.2 Organizations and Individuals

In order to identify current issues and concerns regarding cultural resources in the CCFO Planning Area, letters were sent to 33 government agencies and historical societies, see Section 3.15.4 for the full list. No comments or concerns regarding cultural resources were raised by the respondents.

Chapter 7

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CCST: *See* California Council on Science and Technology

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OPLA: *See* Omnibus Public Lands Management Act

OSHA: *See* Occupational and Safety Health Act

OSHPD: *See* Office of Statewide Health, Planning, and Development

OSPR: *See* Office of Spill Prevention and Response

OSPRA: *See* Oil Spill Prevention and Response Act

— P —

PA: *See* Programmatic Agreement

PAH: *See* Polycyclic aromatic hydrocarbons

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PFC: *See* Properly functioning condition
PFYC: *See* Potential Fossil Yield Classification
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ROD: *See* Record of Decision
ROG: *See* Reactive organic gases
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SGMA: *See* Sustainable Groundwater Management Act
SHMA: *See* Seismic Hazards Mapping Act
SHP: *See* Seismic Hazards Program
SHPO: *See* State Historic Preservation Officer
SIP: *See* State Implementation Plan
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SWRCB: *See* State Water Resource Control Board

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TCP: *See* Traditional Cultural Property
TDS: *See* Total dissolved solids
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TL: *See* Timing Limitation
TMDL: *See* Total maximum daily load
Toluene: 4.11-5
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USACE: *See* U.S. Army Corps of Engineers

USC: *See* United States Code

USDOT: *See* U.S. Department of Transportation

USDW: *See* Underground Source of Drinking Water

USFWS: *See* U.S. Fish and Wildlife Service

USGS: *See* U.S. Geological Survey

UVCE: *See* Unconfined vapor cloud explosion

— V —

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VOC: *See* Volatile organic compounds

Volatile organic compounds: 3.5-1–3.5-3, 3.5-5, 3.5-8, 4.5-1, 4.5-3, 4.5-6, 4.6-2, 4.7-5

VRI: *See* Inventory of visual resources

VRM: *See* Visual resource management

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WDR: *See* Waste Discharge Requirement

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WQO: *See* Water quality objective

WSA: *See* Wilderness Study Area

WSR: *See* Wild and Scenic River

— X —

Xylene: 4.11-5

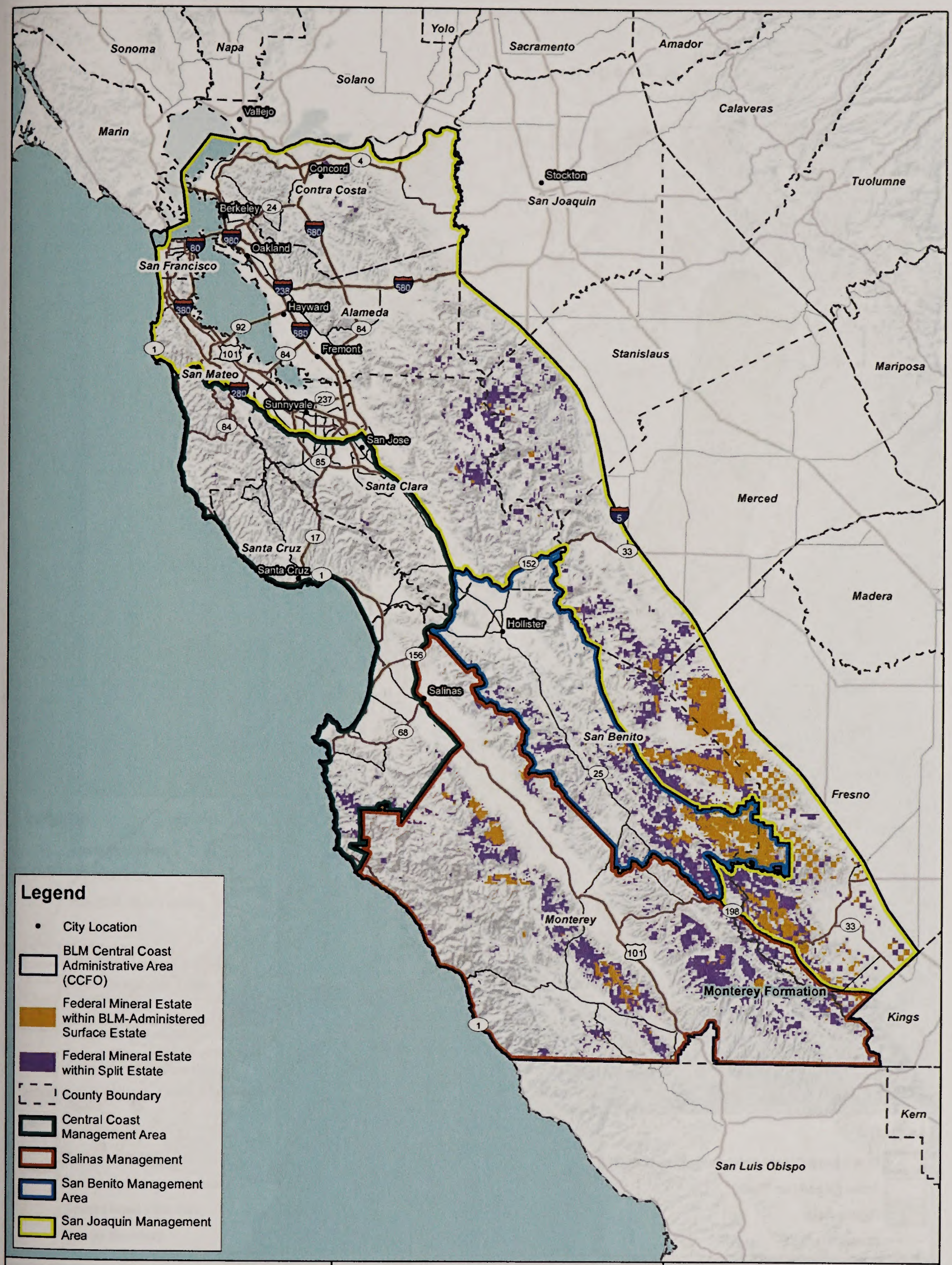
— Z —

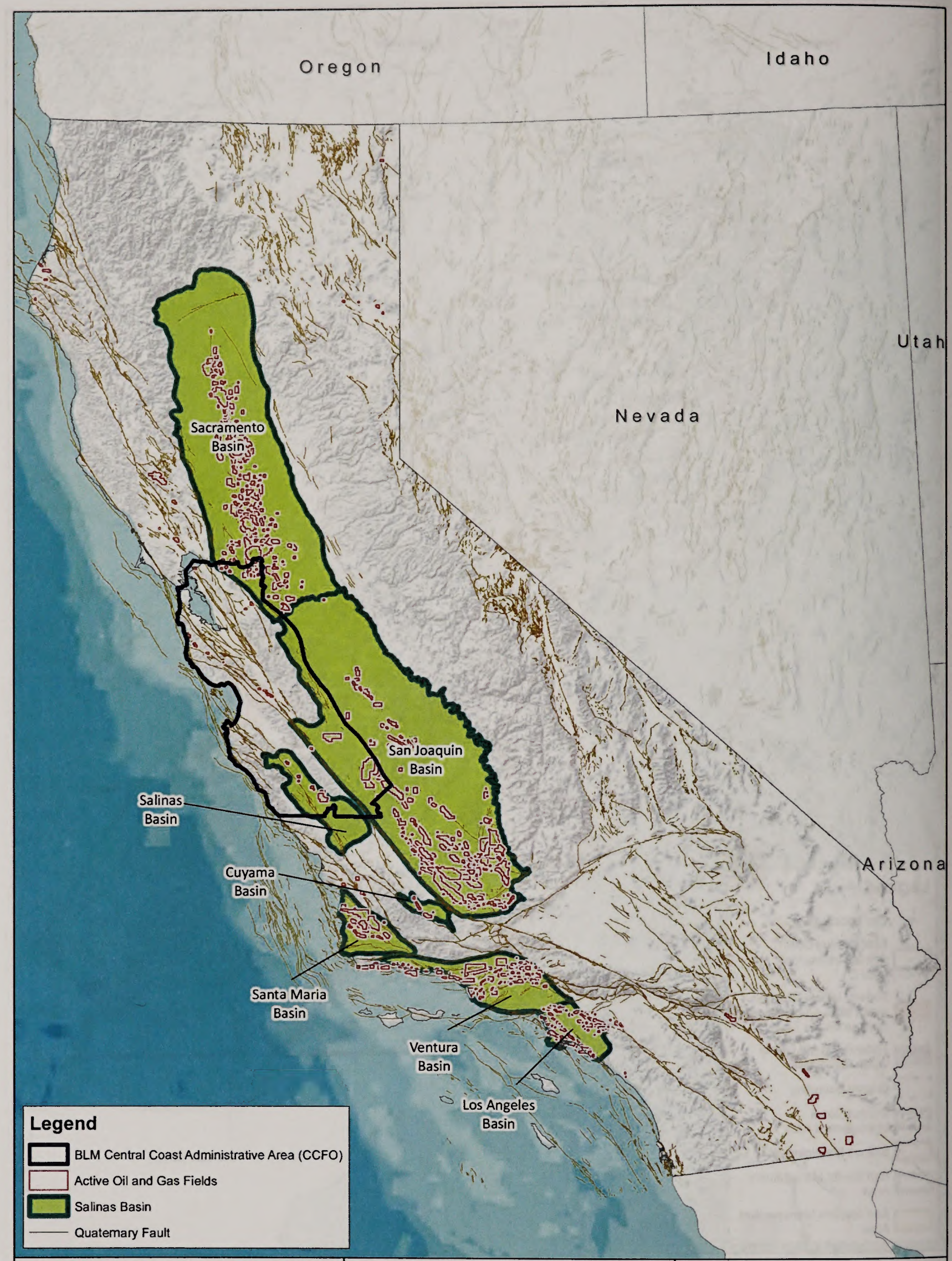
Zero-emission vehicle: 3.6-4

ZEV: *See* Zero-emission vehicle

Appendix A

Figures


Sonoma
Napa
Yolo
Sacramento
Amador
Solano
Vallejo
Marin
Calaveras
Concord
Contra Costa
Stockton
Tuolumne
San Joaquin
Berkeley
Oakland
San Francisco
Hayward
Alameda
Fremont
Stanislaus
Mariposa
San Mateo
Sunnyvale
San Jose
Santa Clara
Merced
Santa Cruz
Santa Cruz
Hollister
Madera
Salinas
San Benito
Fresno
Monterey
Monterey Formation
Kings
Kern
San Luis Obispo
Legend
City Location
BLM Central Coast Administrative Area (CCFO)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
County Boundary
Central Coast Management Area
Salinas Management
San Benito Management Area
San Joaquin Management Area
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
N
W
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S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 1-1
Federal Mineral Estate within the BLM Central Coast Field Office Administrative Area
Date: December 2016



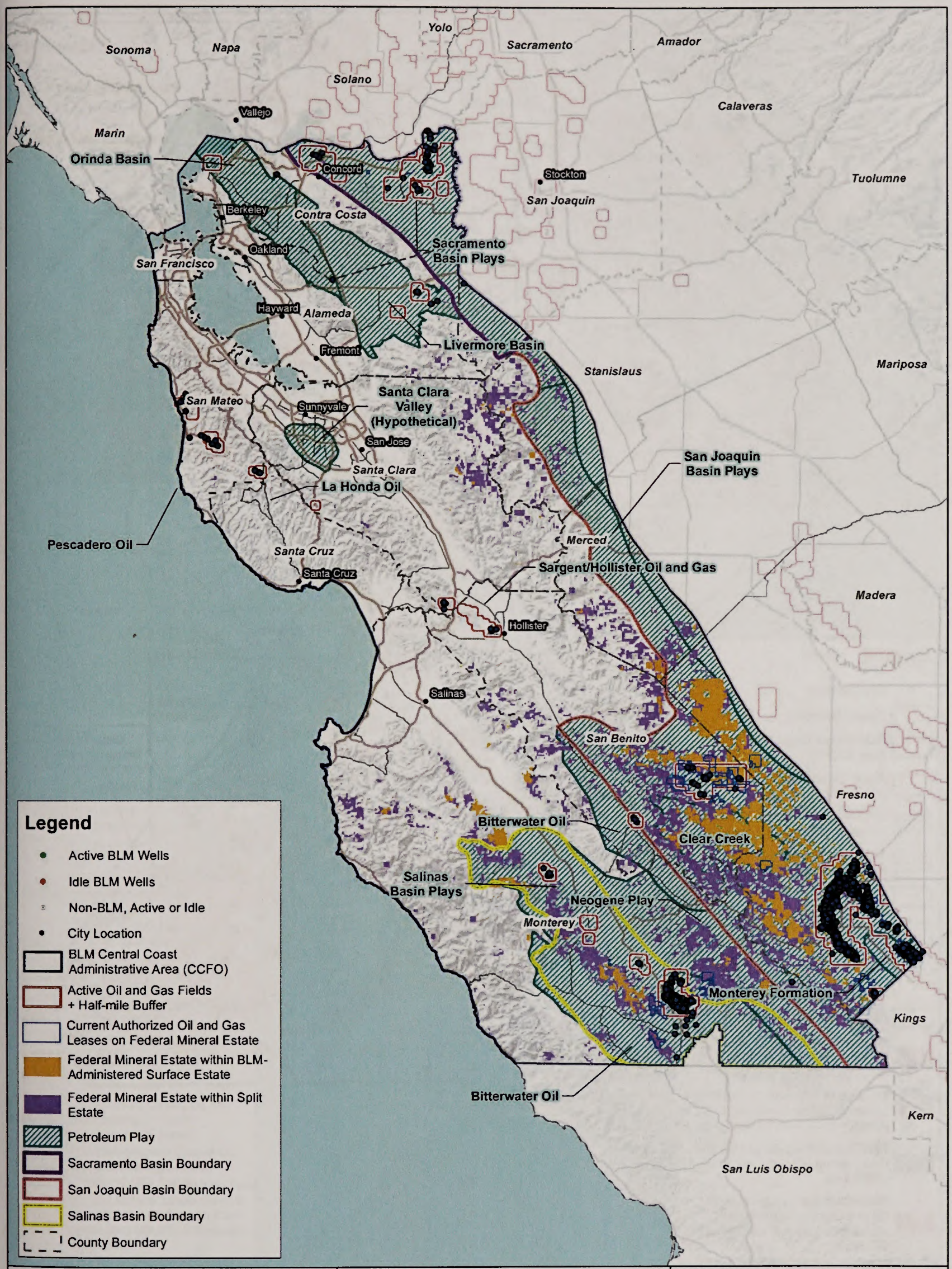
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Figure 1-2

Major Sedimentary Basins and Faults in California

Date: December 2016



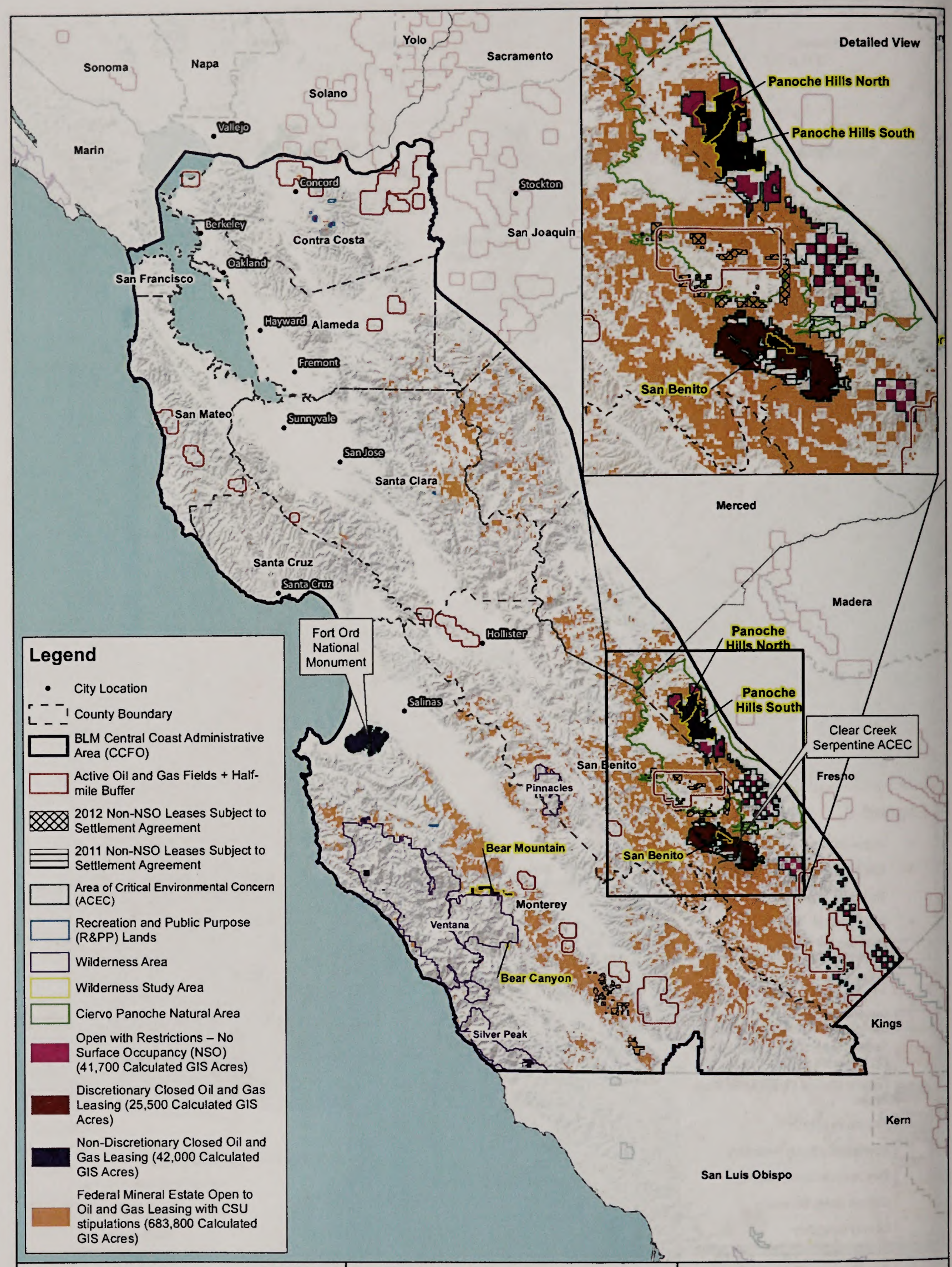
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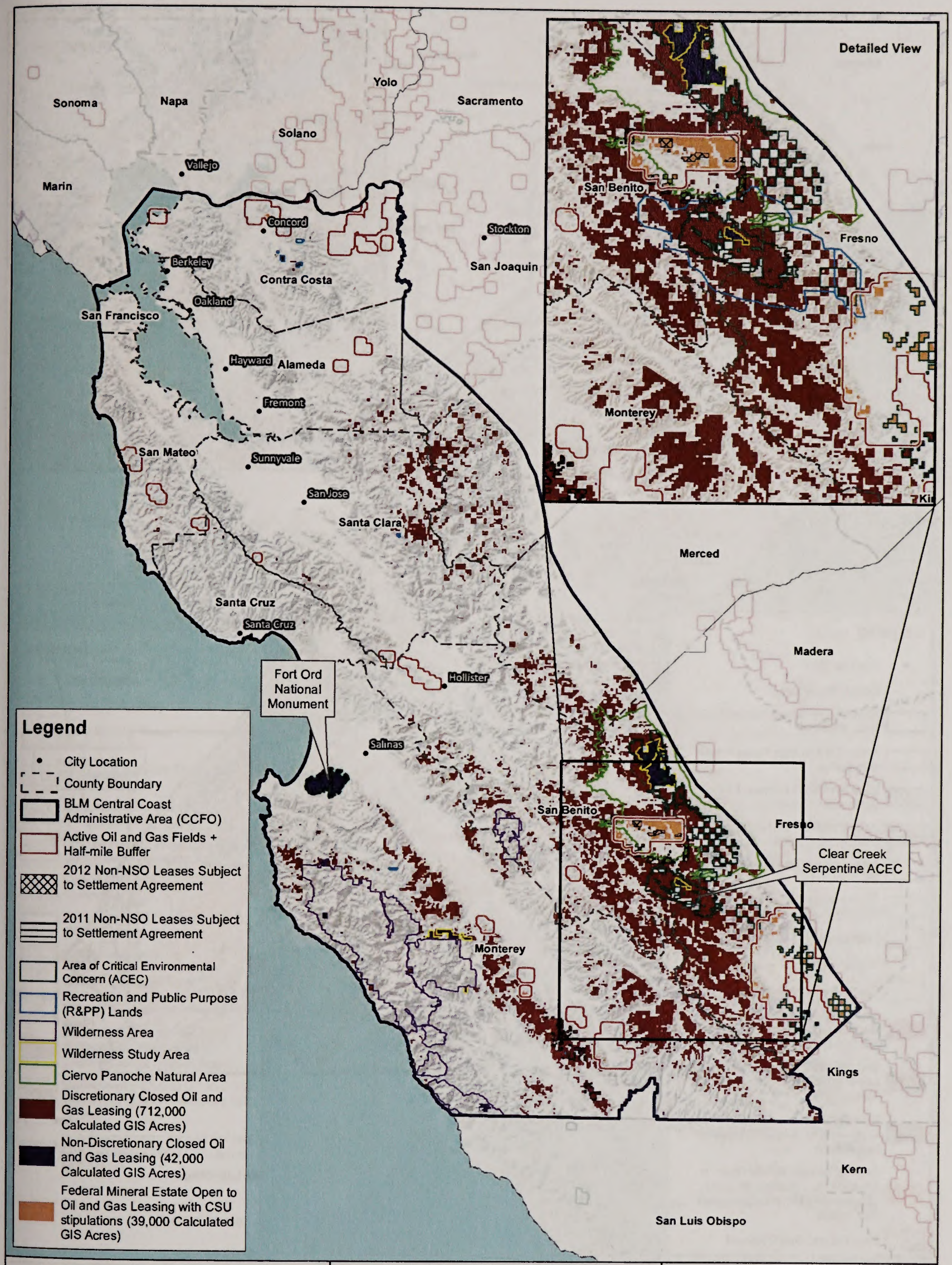
CENTRAL COAST FIELD OFFICE

Figure 1-3

Plays and Active Oil and Gas Wells within the BLM Central Coast Field Office Administrative Area

Date: December 2016


Detailed View
Panoche Hills North
Panoche Hills South
San Benito
Sonoma
Napa
Yolo
Sacramento
Solano
Vallejo
Marin
Concord
Stockton
Berkeley
Contra Costa
San Joaquin
Oakland
San Francisco
Hayward
Alameda
Fremont
San Mateo
Sunnyvale
San Jose
Santa Clara
Merced
Santa Cruz
Santa Cruz
Madera
Hollister
Fort Ord National Monument
Salinas
Clear Creek Serpentine ACEC
Fresno
Pinnacles
Bear Mountain
Monterey
Ventana
Bear Canyon
Silver Peak
Kings
Kern
San Luis Obispo
Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
Active Oil and Gas Fields + Half-mile Buffer
2012 Non-NSO Leases Subject to Settlement Agreement
2011 Non-NSO Leases Subject to Settlement Agreement
Area of Critical Environmental Concern (ACEC)
Recreation and Public Purpose (R&PP) Lands
Wilderness Area
Wilderness Study Area
Ciervo Panoche Natural Area
Open with Restrictions – No Surface Occupancy (NSO) (41,700 Calculated GIS Acres)
Discretionary Closed Oil and Gas Leasing (25,500 Calculated GIS Acres)
Non-Discretionary Closed Oil and Gas Leasing (42,000 Calculated GIS Acres)
Federal Mineral Estate Open to Oil and Gas Leasing with CSU stipulations (683,800 Calculated GIS Acres)
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference: UTM Zone 10 NAD83
Scale 1:1,000,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 2-1
Alternative A
(No Action Alternative)
Date: December 2016



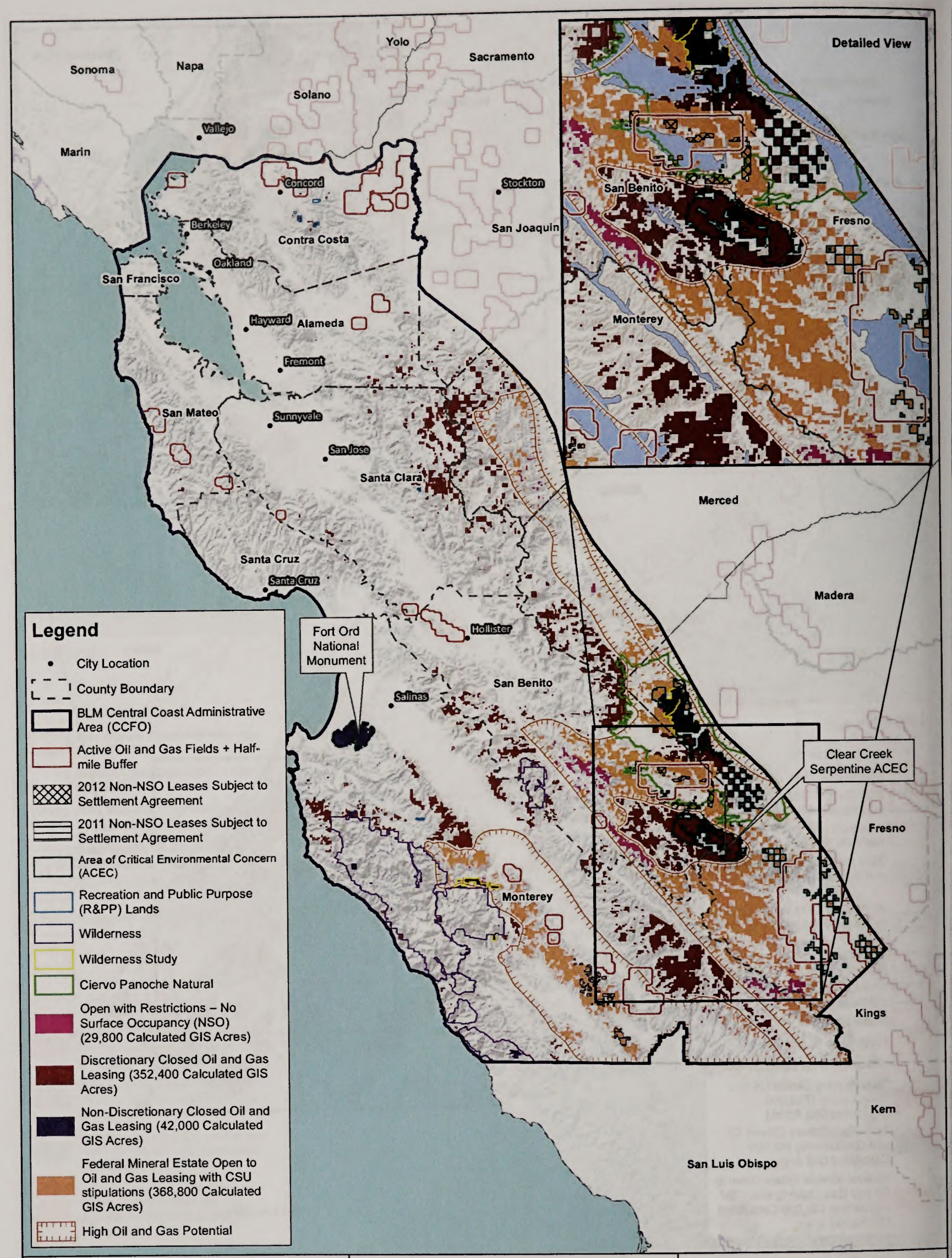
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CENTRAL COAST FIELD OFFICE

Figure 2-2

Alternative B

Date: December 2016



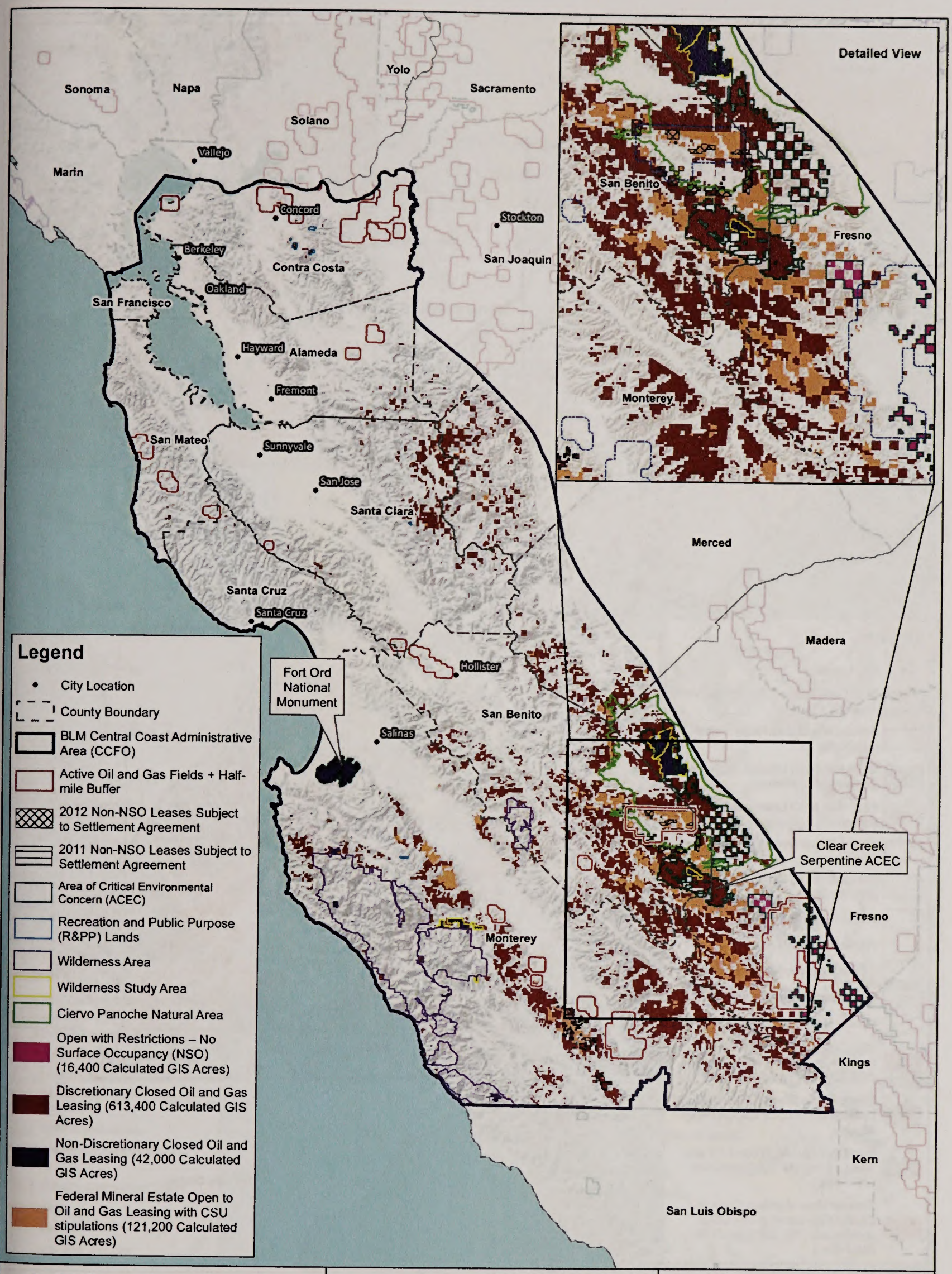
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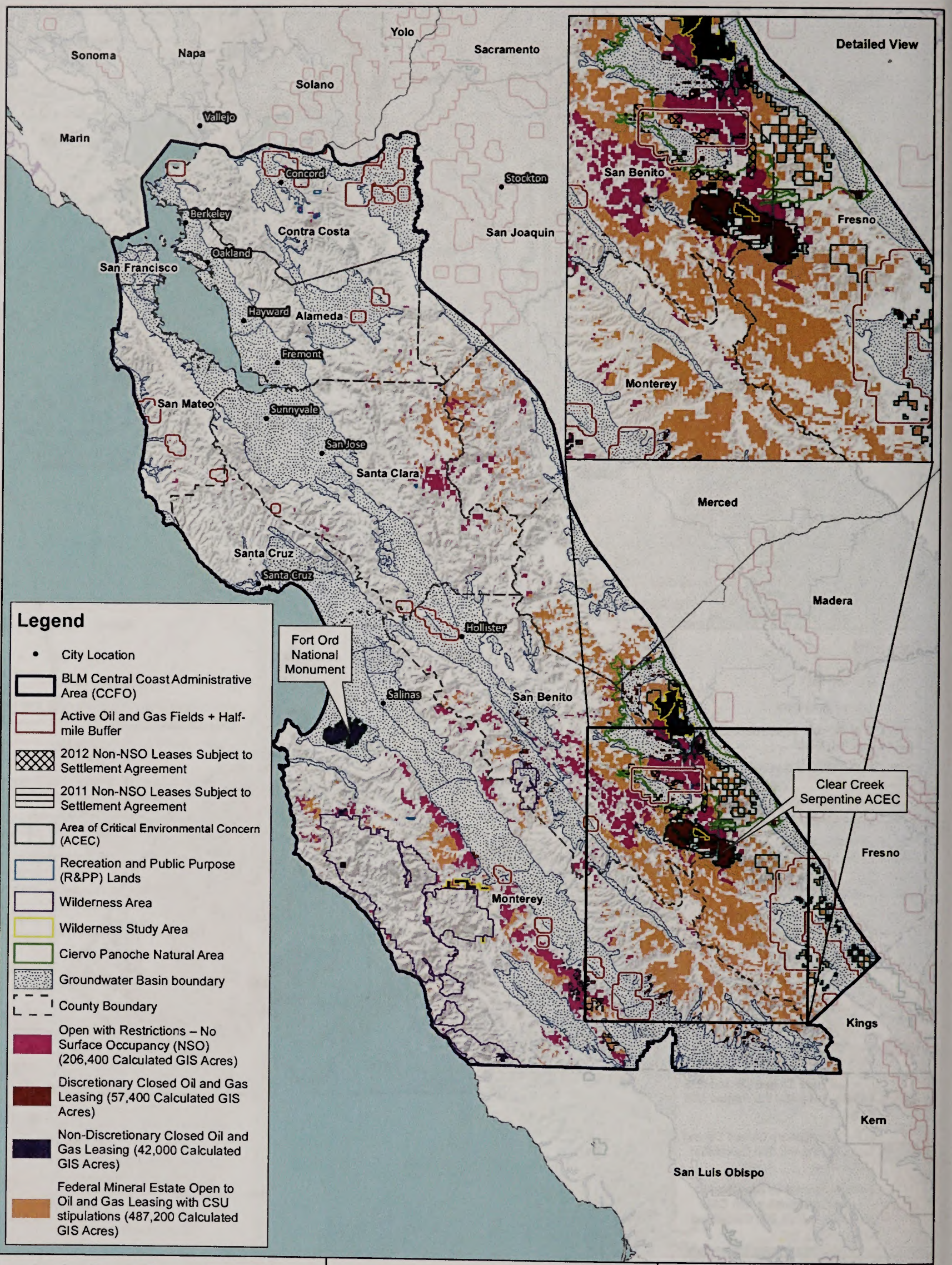
CENTRAL COAST FIELD OFFICE

Figure 2-3

Alternative C

Date: December 2016


Detailed View
Sonoma
Napa
Yolo
Sacramento
Solano
Vallejo
Marin
Concord
Stockton
Berkeley
Contra Costa
San Joaquin
Oakland
San Francisco
Hayward
Alameda
Fremont
San Mateo
Sunnyvale
San Jose
Santa Clara
Santa Cruz
Santa Cruz
Hollister
San Benito
Salinas
Monterey
Fresno
Merced
Madera
Kings
Kern
San Luis Obispo
Fort Ord National Monument
Clear Creek Serpentine ACEC
Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
Active Oil and Gas Fields + Half-mile Buffer
2012 Non-NSO Leases Subject to Settlement Agreement
2011 Non-NSO Leases Subject to Settlement Agreement
Area of Critical Environmental Concern (ACEC)
Recreation and Public Purpose (R&PP) Lands
Wilderness Area
Wilderness Study Area
Ciervo Panoche Natural Area
Open with Restrictions – No Surface Occupancy (NSO) (16,400 Calculated GIS Acres)
Discretionary Closed Oil and Gas Leasing (613,400 Calculated GIS Acres)
Non-Discretionary Closed Oil and Gas Leasing (42,000 Calculated GIS Acres)
Federal Mineral Estate Open to Oil and Gas Leasing with CSU stipulations (121,200 Calculated GIS Acres)
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference: UTM Zone 10 NAD83
Scale 1:1,000,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 2-4
Alternative D
Date: December 2016



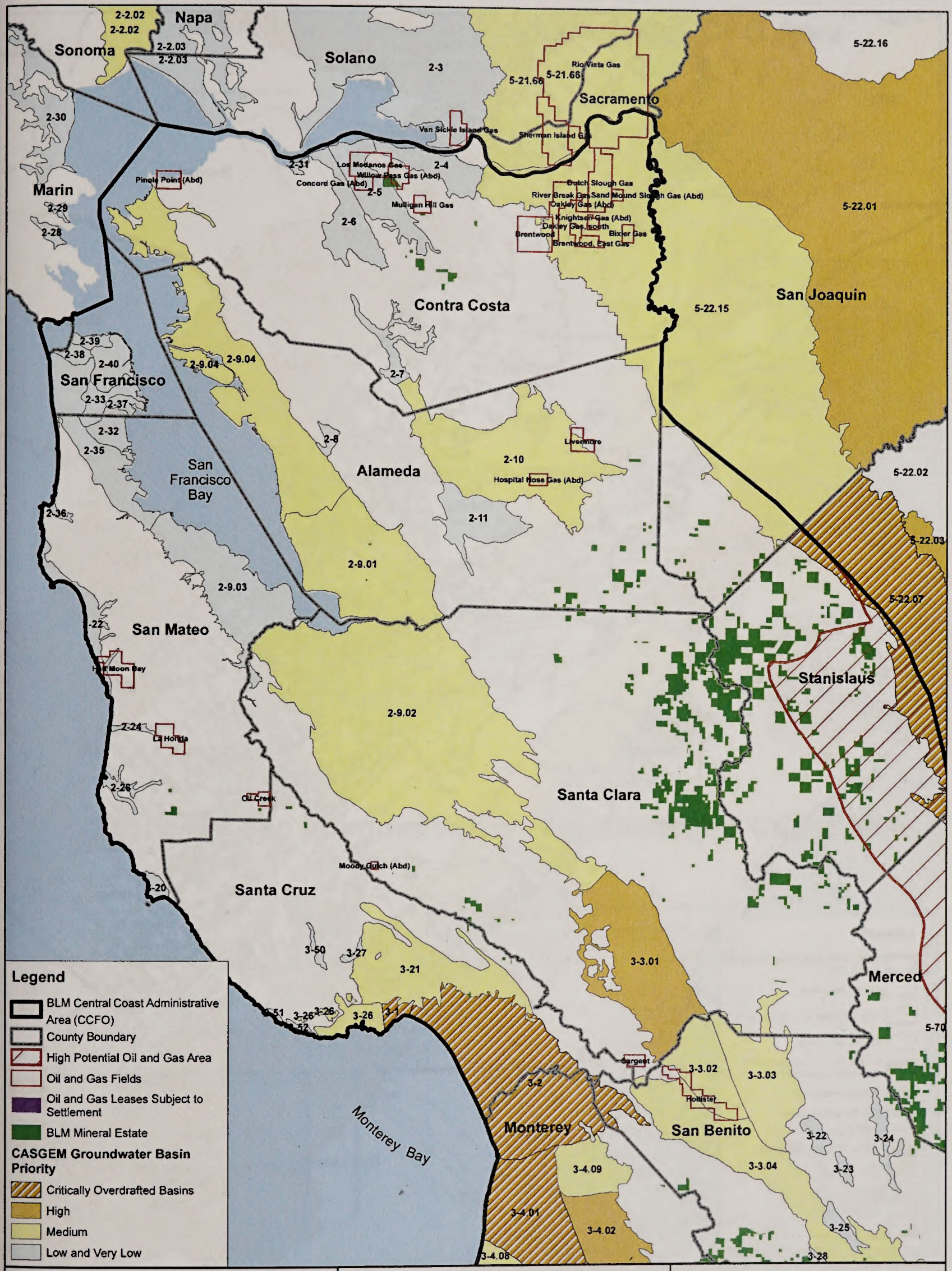
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 2-5

Alternative E

Date: December 2016



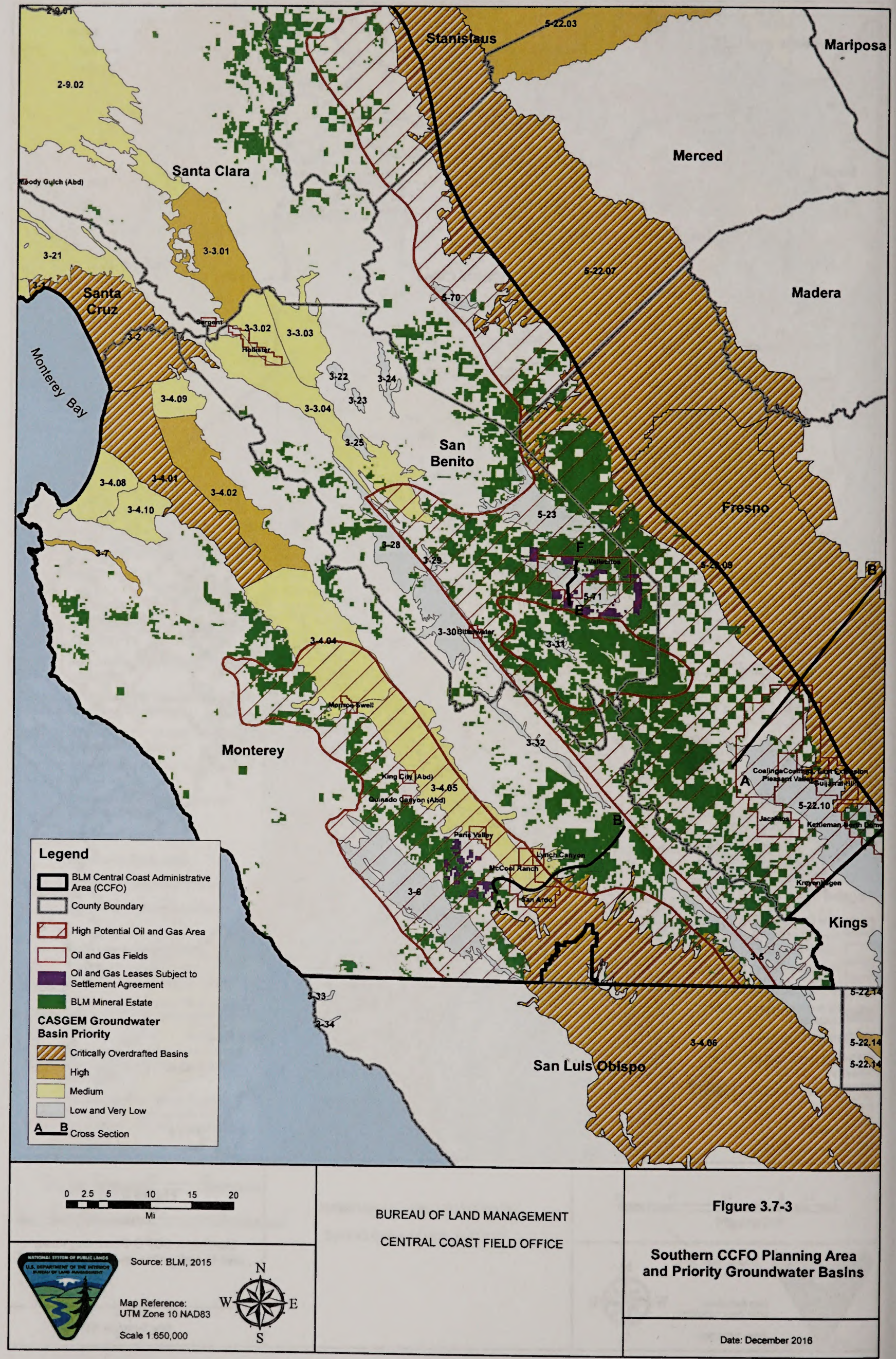
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 3.7-2

Northern CCFO Planning Area and Priority Groundwater Basins

Date: December 2016



BUREAU OF LAND MANAGEMENT

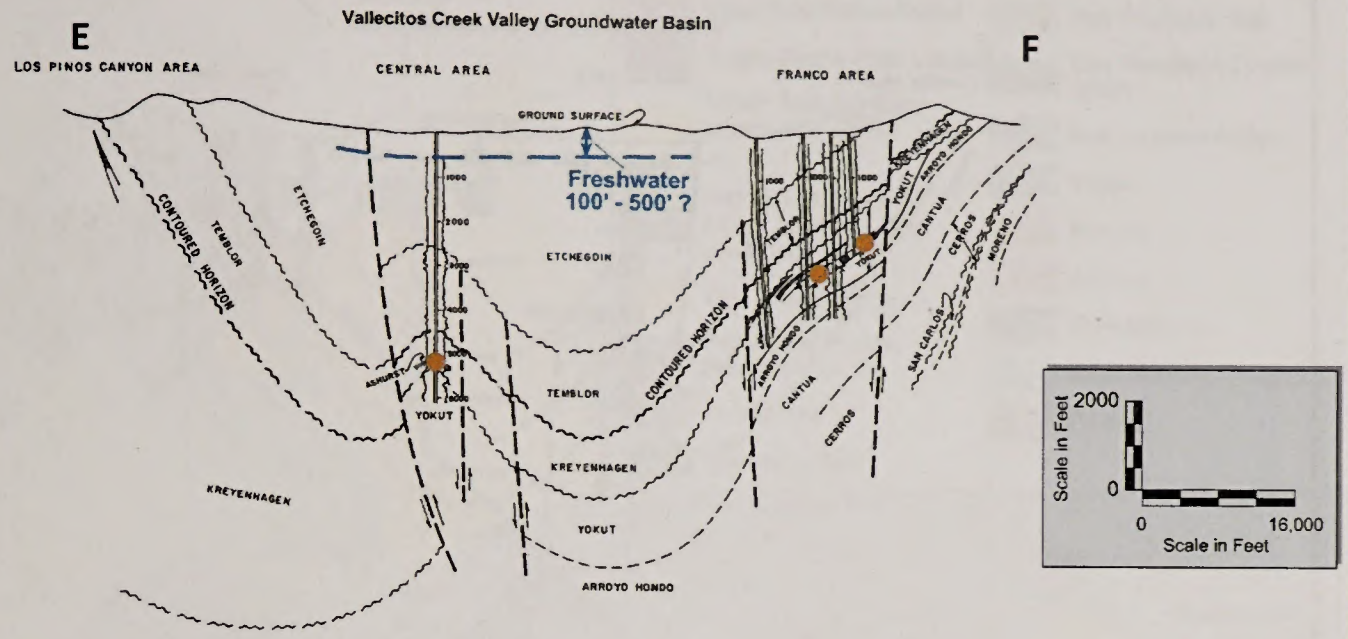
CENTRAL COAST FIELD OFFICE

Figure 3.7-3

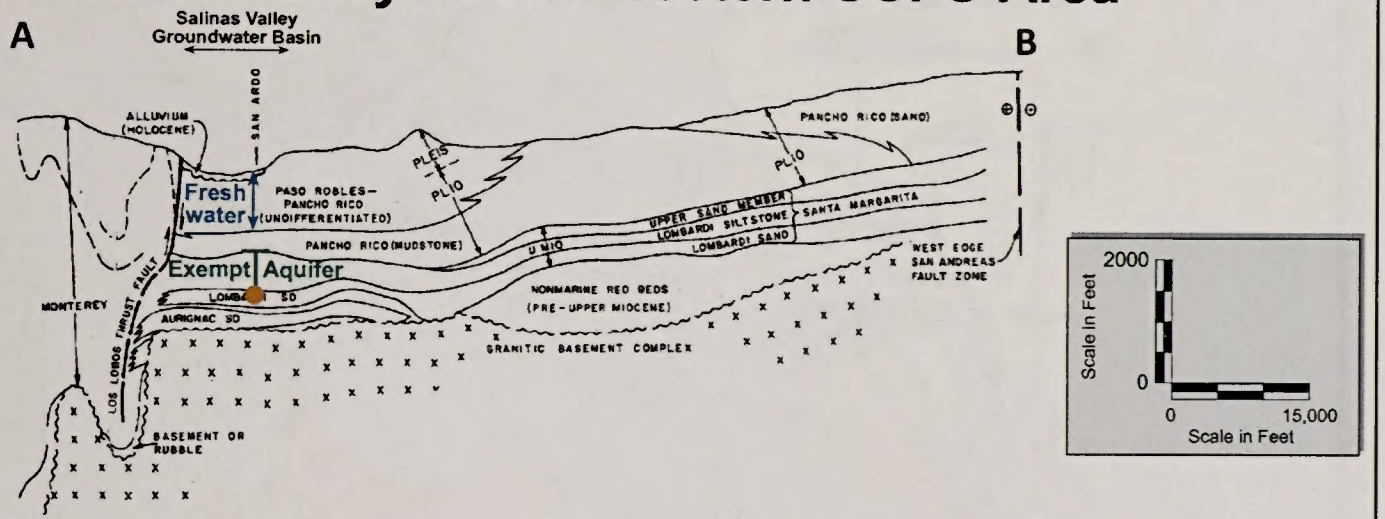
Southern CCFO Planning Area and Priority Groundwater Basins

Date: December 2016

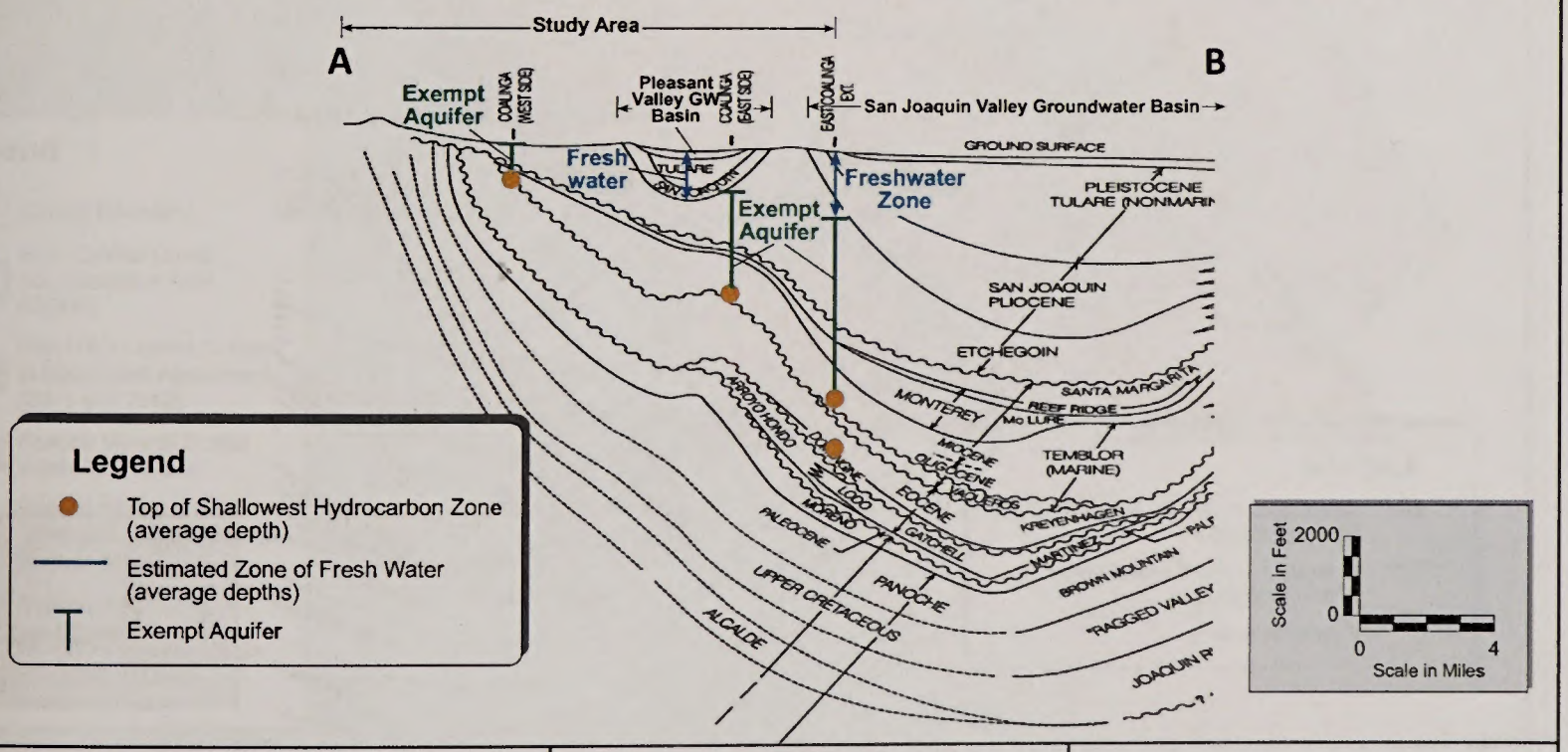
Vallecitos Oil Field - Southeastern CCFO Area



Salinas Valley - Southwestern CCFO Area



West Side San Joaquin Valley - Southeastern CCFO Area



BUREAU OF LAND MANAGEMENT

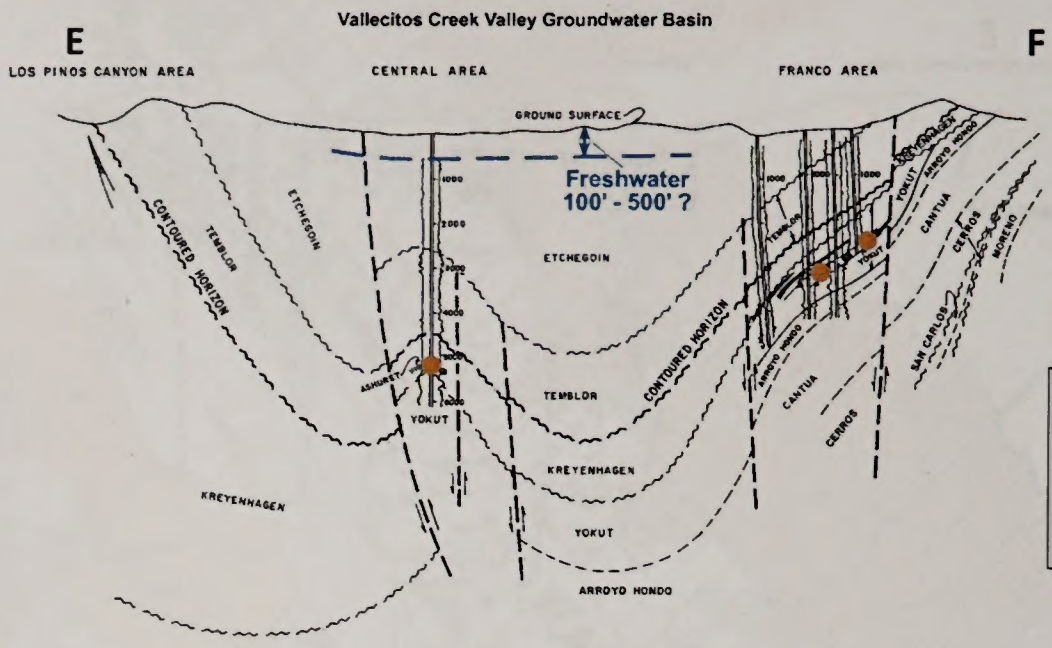
CENTRAL COAST FIELD OFFICE

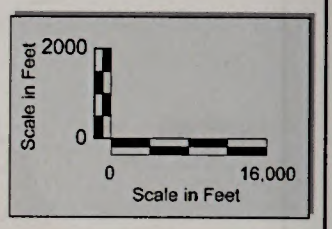
Figure 3.7-4

Example Geologic Cross Sections, Southern CCFO Planning Area

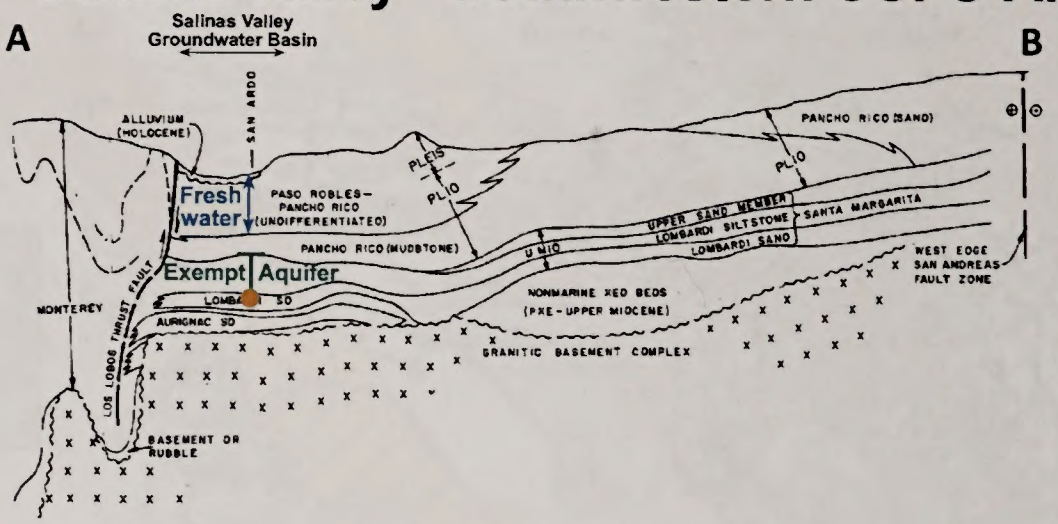
Date: December 2016

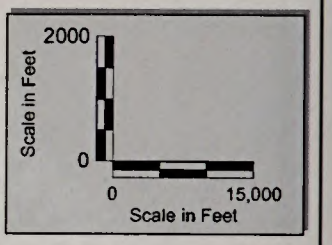
Vallecitos Oil Field - Southeastern CCFO Area



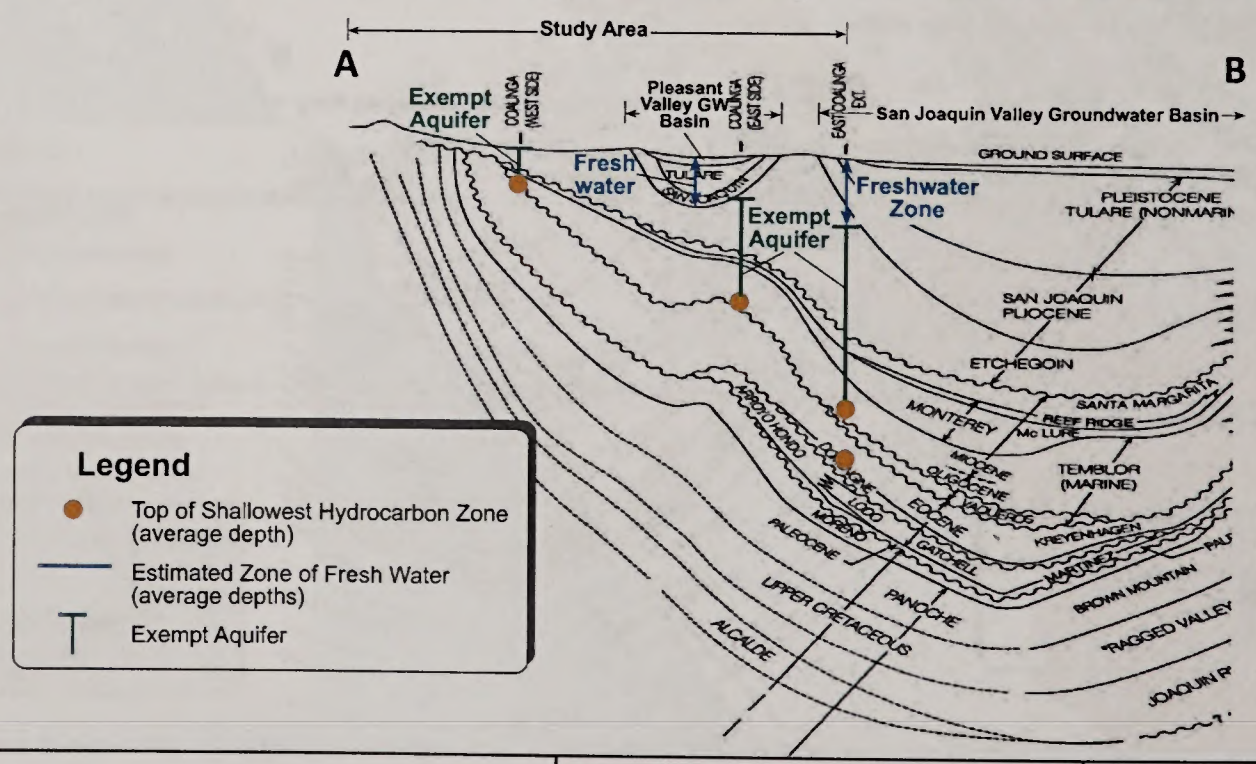


Salinas Valley - Southwestern CCFO Area



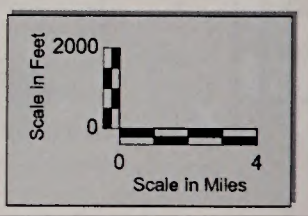


West Side San Joaquin Valley - Southeastern CCFO Area



Legend

- Top of Shallowest Hydrocarbon Zone (average depth)
- Estimated Zone of Fresh Water (average depths)
- Exempt Aquifer



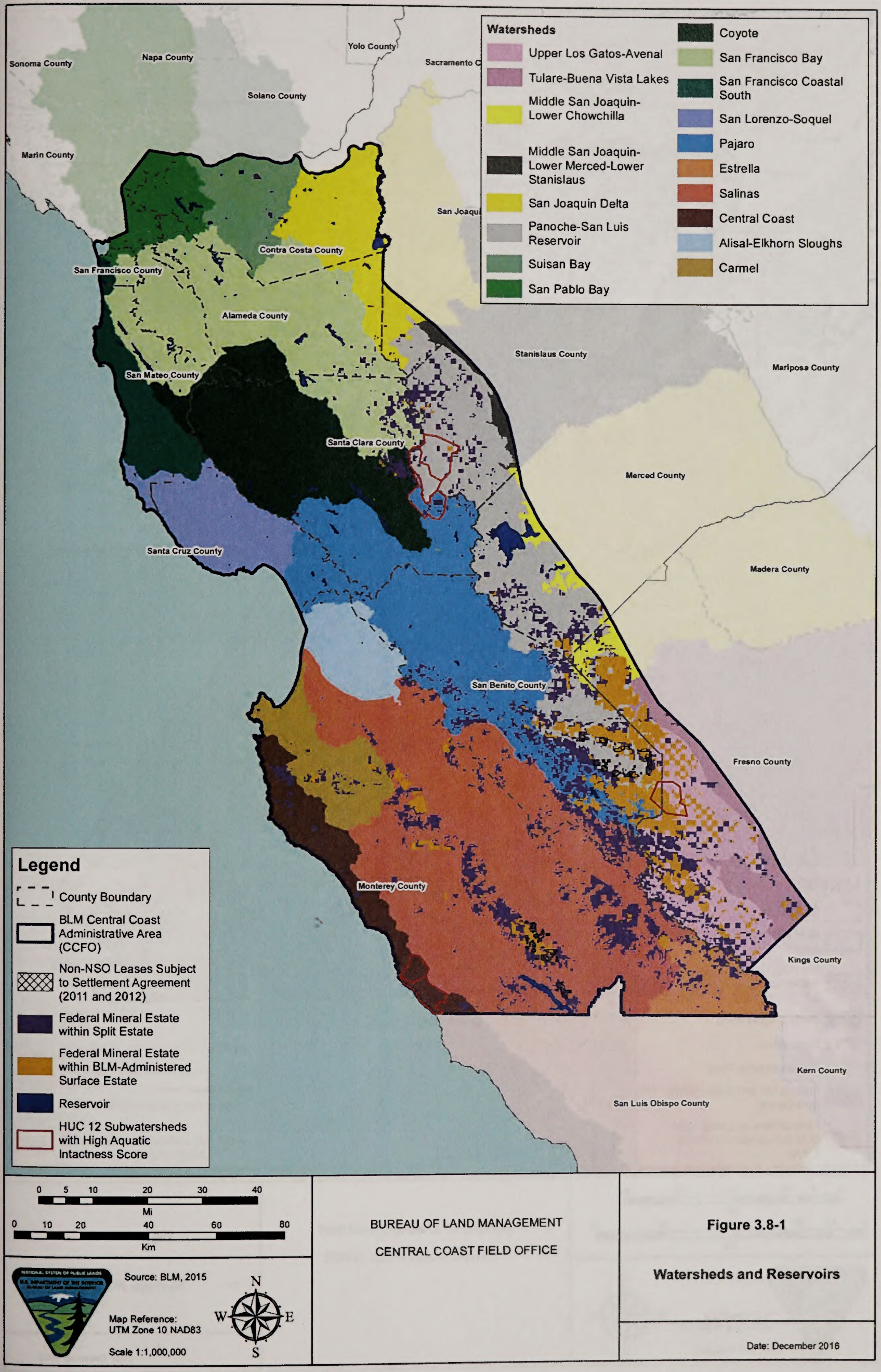
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 3.7-4

Example Geologic Cross Sections, Southern CCFO Planning Area

Date: December 2016



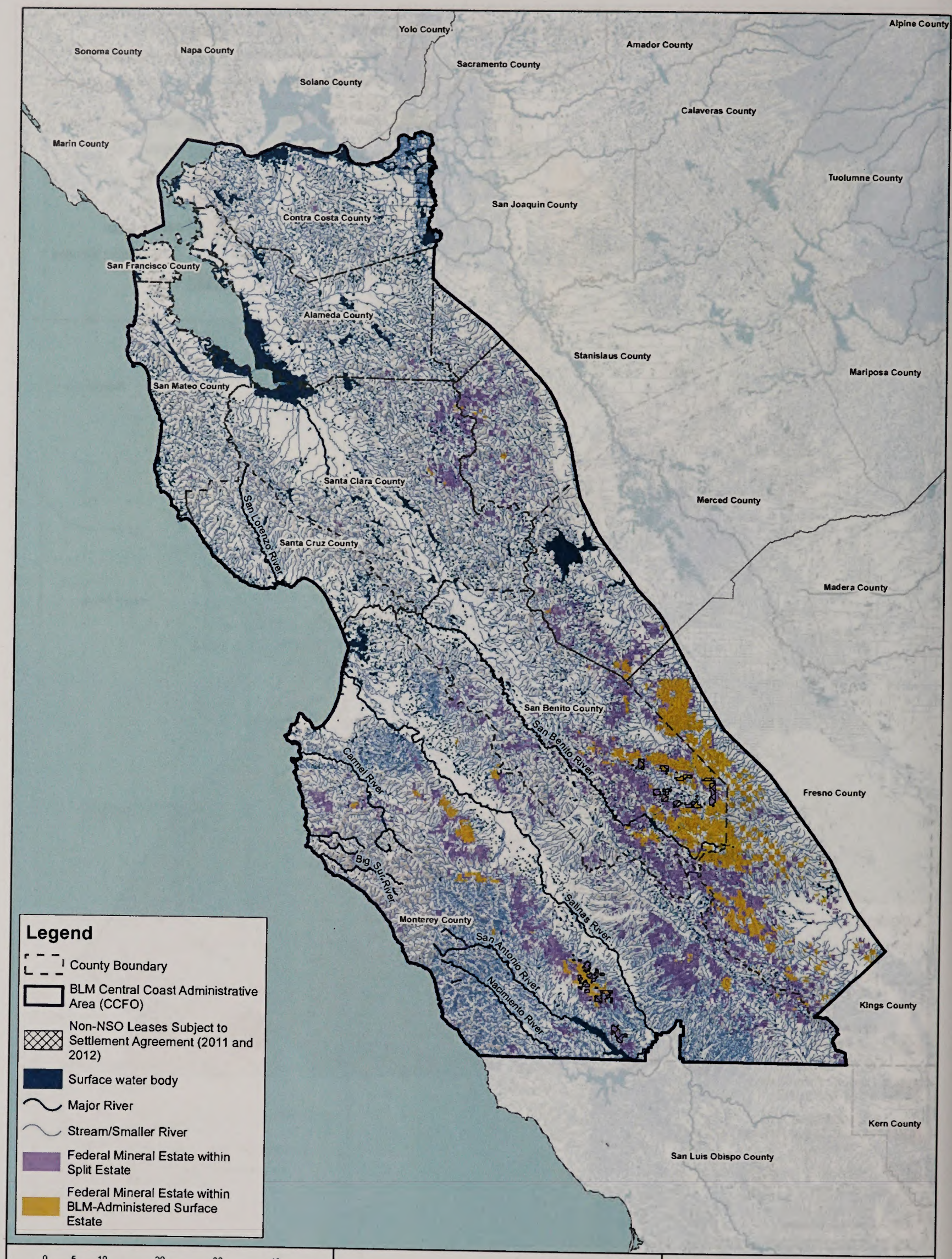
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 3.8-1

Watersheds and Reservoirs

Date: December 2016


Yolo County
Alpine County
Sonoma County
Napa County
Amador County
Sacramento County
Solano County
Calaveras County
Marin County
Tuolumne County
San Joaquin County
Contra Costa County
San Francisco County
Alameda County
Stanislaus County
Mariposa County
San Mateo County
Santa Clara County
Merced County
San Lorenzo River
Santa Cruz County
Madera County
San Benito County
San Benito River
Carmel River
Fresno County
Big Sur River
Salinas River
Monterey County
San Antonio River
Nacimiento River
Kings County
Kern County
San Luis Obispo County
Legend
County Boundary
BLM Central Coast Administrative Area (CCFO)
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Surface water body
Major River
Stream/Smaller River
Federal Mineral Estate within Split Estate
Federal Mineral Estate within BLM-Administered Surface Estate
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.8-2
Surface Waters
Date: December 2016

Sonoma
Napa
Yolo
Sacramento
Amador
Solano
Calaveras
Vallejo
Marin
Concord
Stockton
Tuolumne
San Joaquin
Berkeley
Contra Costa
Oakland
San Francisco
Hayward
Alameda
Fremont
Stanislaus
Mariposa
San Mateo
Sunnyvale
San Jose
Santa Clara
Merced
Santa Cruz
Santa Cruz
Madera
Hollister
Salinas
San Benito
Fresno
Monterey
Kings
Kern
San Luis Obispo

Legend

- City Location
- County Boundary
- BLM Central Coast Administrative Area (CCFO)
- Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
- 100-year Floodplain, detailed study
- 100-year Floodplain, Zone A Approximate
- Federal Mineral Estate within Split Estate
- Federal Mineral Estate within BLM-Administered Surface Estate

0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km

Source: BLM, 2015

Map Reference:
UTM Zone 10 NAD83

Scale 1:1,000,000

N
W E
S

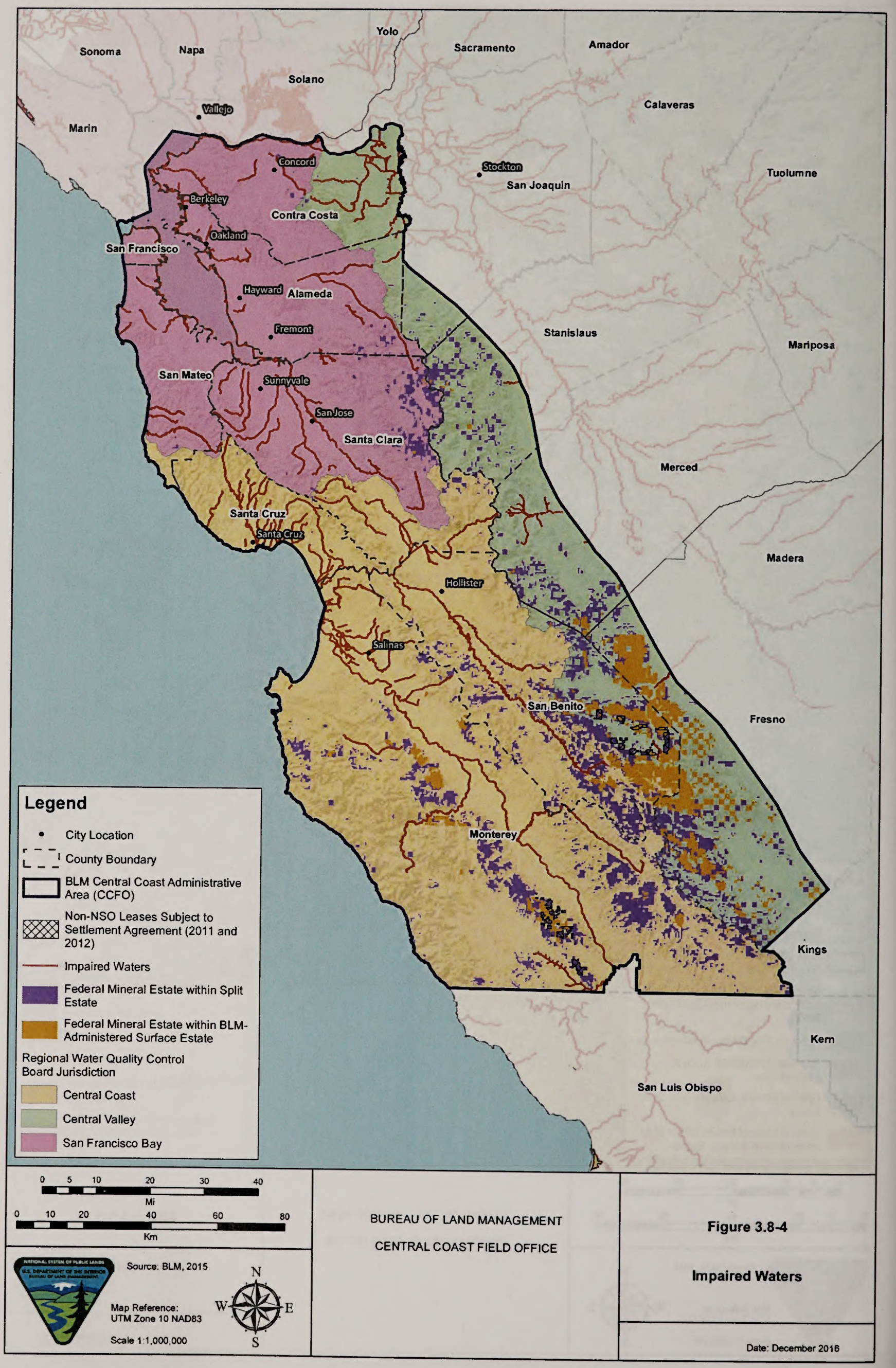
BUREAU OF LAND MANAGEMENT

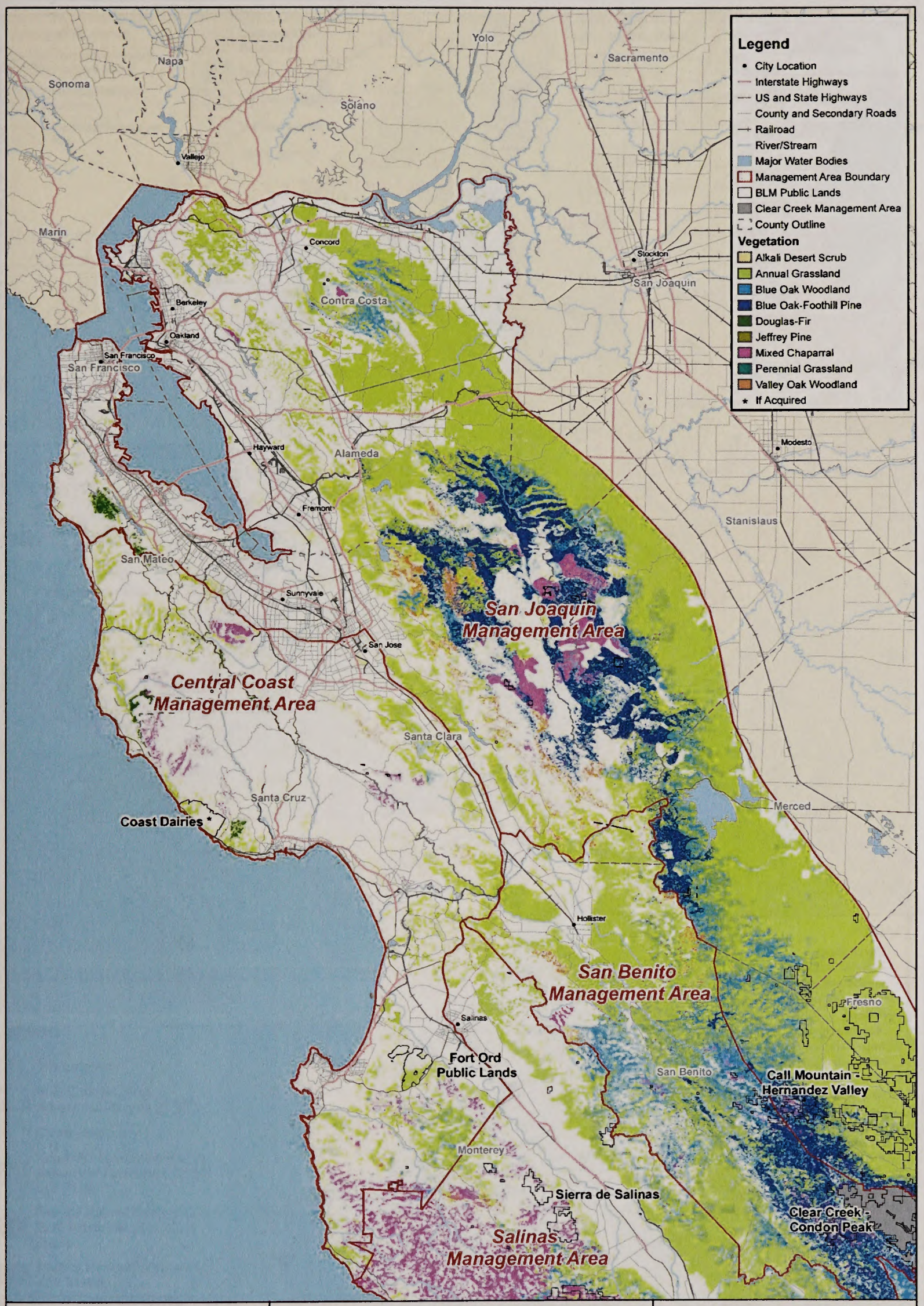
CENTRAL COAST FIELD OFFICE

Figure 3.8-3

Floodplains

Date: December 2016


Sonoma
Napa
Yolo
Sacramento
Amador
Solano
Vallejo
Marin
Calaveras
Concord
Stockton
Tuolumne
San Joaquin
Berkeley
Contra Costa
Oakland
San Francisco
Hayward
Alameda
Fremont
Stanislaus
Mariposa
San Mateo
Sunnyvale
San Jose
Santa Clara
Merced
Santa Cruz
Santa Cruz
Hollister
Madera
Salinas
San Benito
Fresno
Monterey
Kings
Kern
San Luis Obispo
Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Impaired Waters
Federal Mineral Estate within Split Estate
Federal Mineral Estate within BLM-Administered Surface Estate
Regional Water Quality Control Board Jurisdiction
Central Coast
Central Valley
San Francisco Bay
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference: UTM Zone 10 NAD83
Scale 1:1,000,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.8-4
Impaired Waters
Date: December 2016



0 2.5 5 10 15 20 25
Miles

0 2.5 5 10 15 20 25 30 35 40
Kilometers

Map Reference:
UTM Zone 10 NAD83
Scale 1:700,000

N
W E
S

Adapted from BLM, 2005

BUREAU OF LAND MANAGEMENT

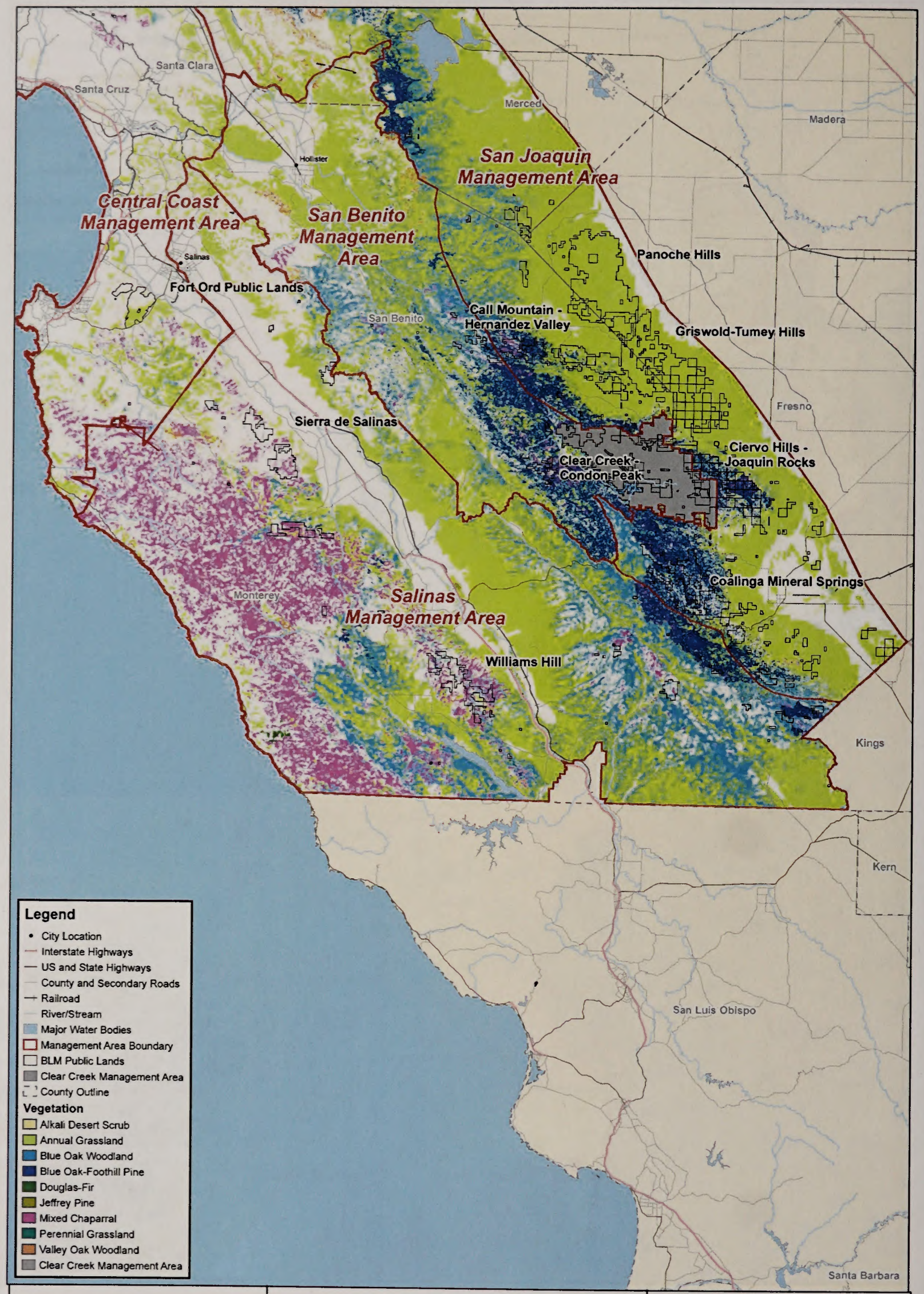
CENTRAL COAST FIELD OFFICE

Figure 3.10-1a

VEGETATION COMMUNITY

Northern Section

Date: December 2016



BUREAU OF LAND MANAGEMENT

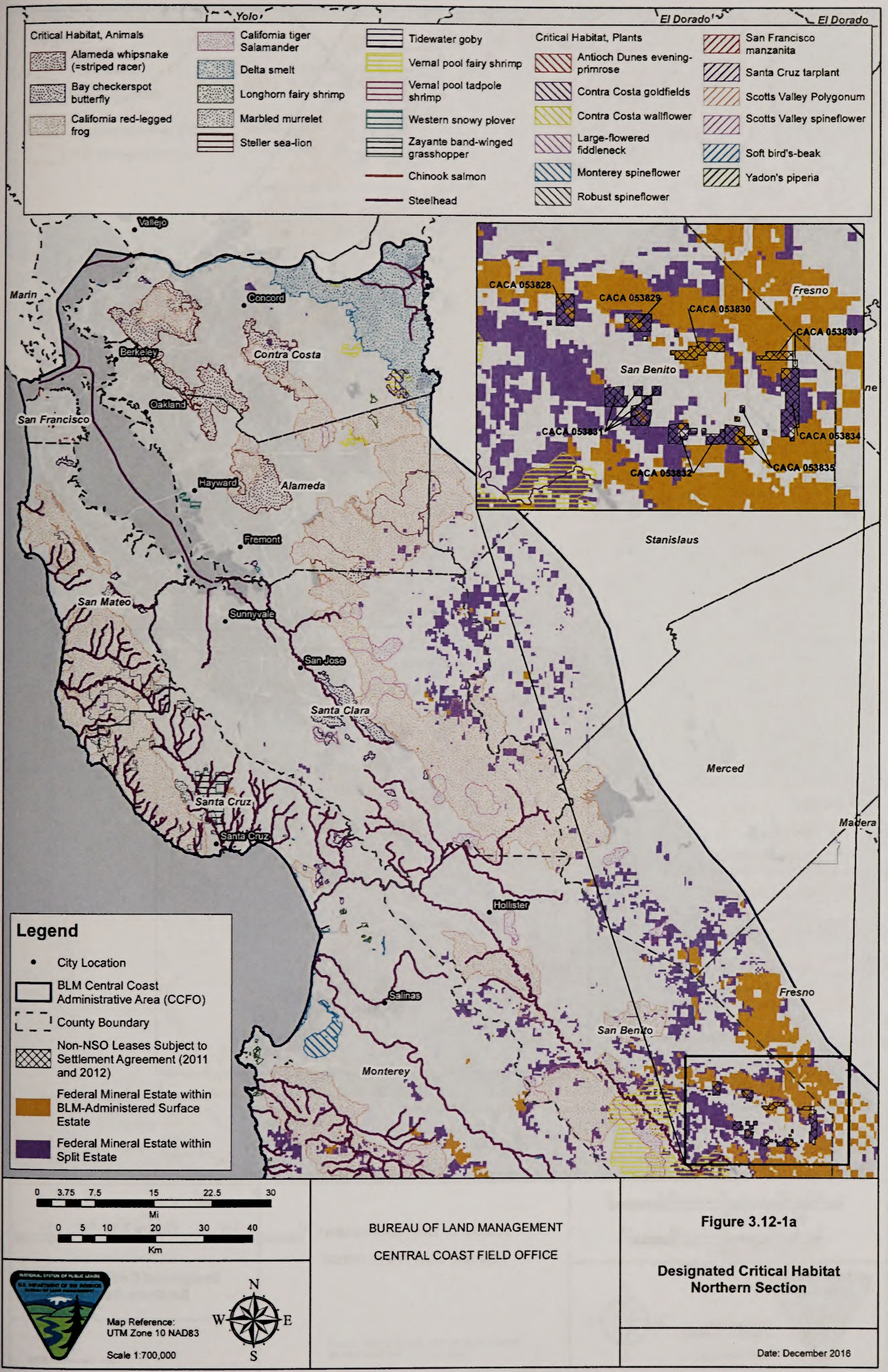
CENTRAL COAST FIELD OFFICE

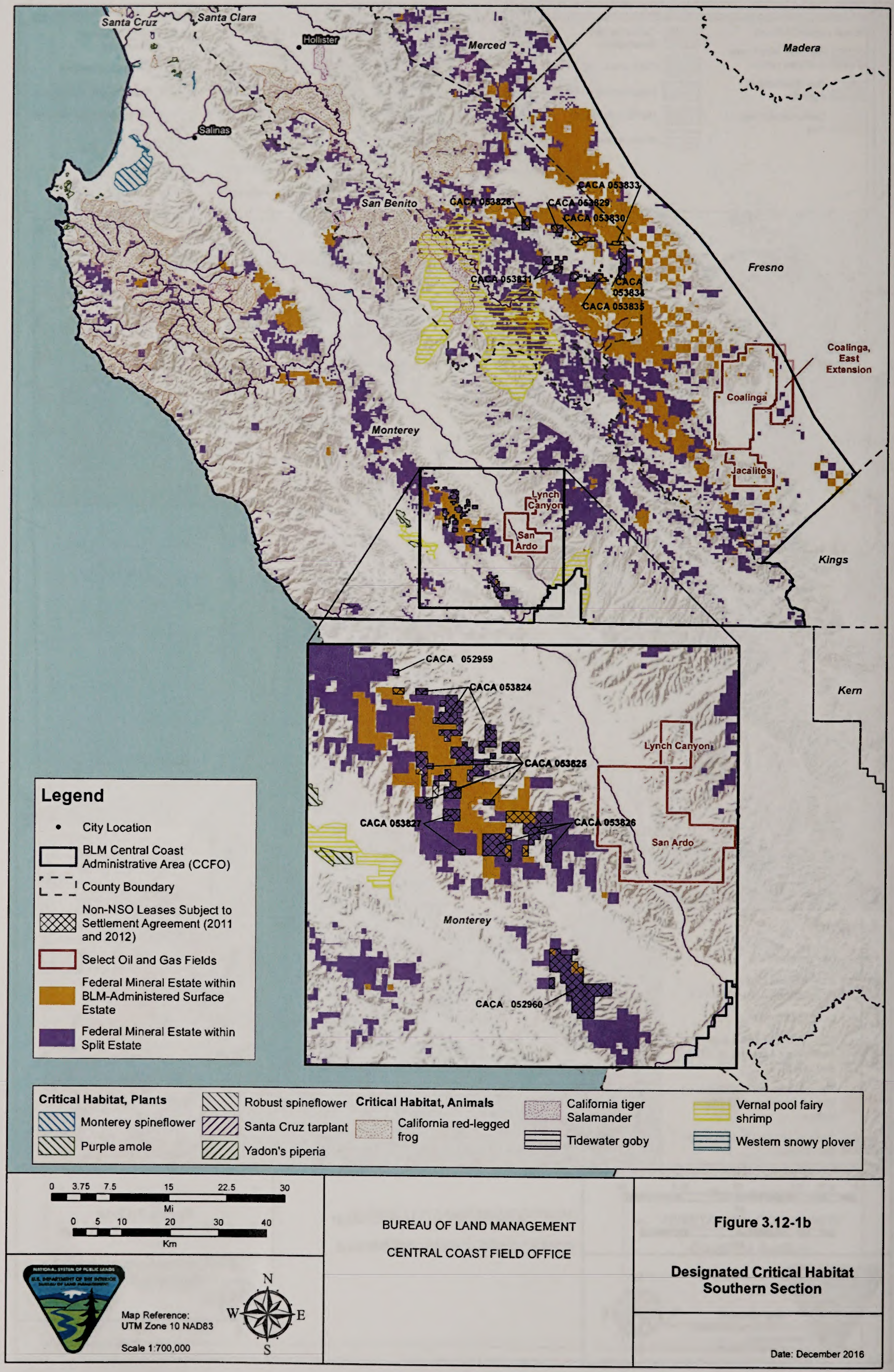
Figure 3.10-1b

VEGETATION COMMUNITY

Southern Section

Date: December 2016


Critical Habitat, Animals
Alameda whipsnake (=striped racer)
Bay checkerspot butterfly
California red-legged frog
California tiger Salamander
Delta smelt
Longhorn fairy shrimp
Marbled murrelet
Steller sea-lion
Tidewater goby
Vernal pool fairy shrimp
Vernal pool tadpole shrimp
Western snowy plover
Zayante band-winged grasshopper
Chinook salmon
Steelhead
Critical Habitat, Plants
Antioch Dunes evening-primrose
Contra Costa goldfields
Contra Costa wallflower
Large-flowered fiddleneck
Monterey spineflower
Robust spineflower
San Francisco manzanita
Santa Cruz tarplant
Scotts Valley Polygonum
Scotts Valley spineflower
Soft bird's-beak
Yadon's piperia
CACA 053828
CACA 053829
CACA 053830
CACA 053833
CACA 053831
CACA 053834
CACA 053832
CACA 053835
Yolo
El Dorado
Vallejo
Marin
Concord
Contra Costa
Berkeley
Oakland
San Francisco
Hayward
Alameda
Fremont
San Mateo
Sunnyvale
San Jose
Santa Clara
Santa Cruz
Santa Cruz
Hollister
Salinas
Monterey
San Benito
Fresno
Stanislaus
Merced
Madera
Legend
City Location
BLM Central Coast Administrative Area (CCFO)
County Boundary
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
0 3.75 7.5 15 22.5 30
Mi
0 5 10 20 30 40
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:700,000
N
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.12-1a
Designated Critical Habitat
Northern Section
Date: December 2016



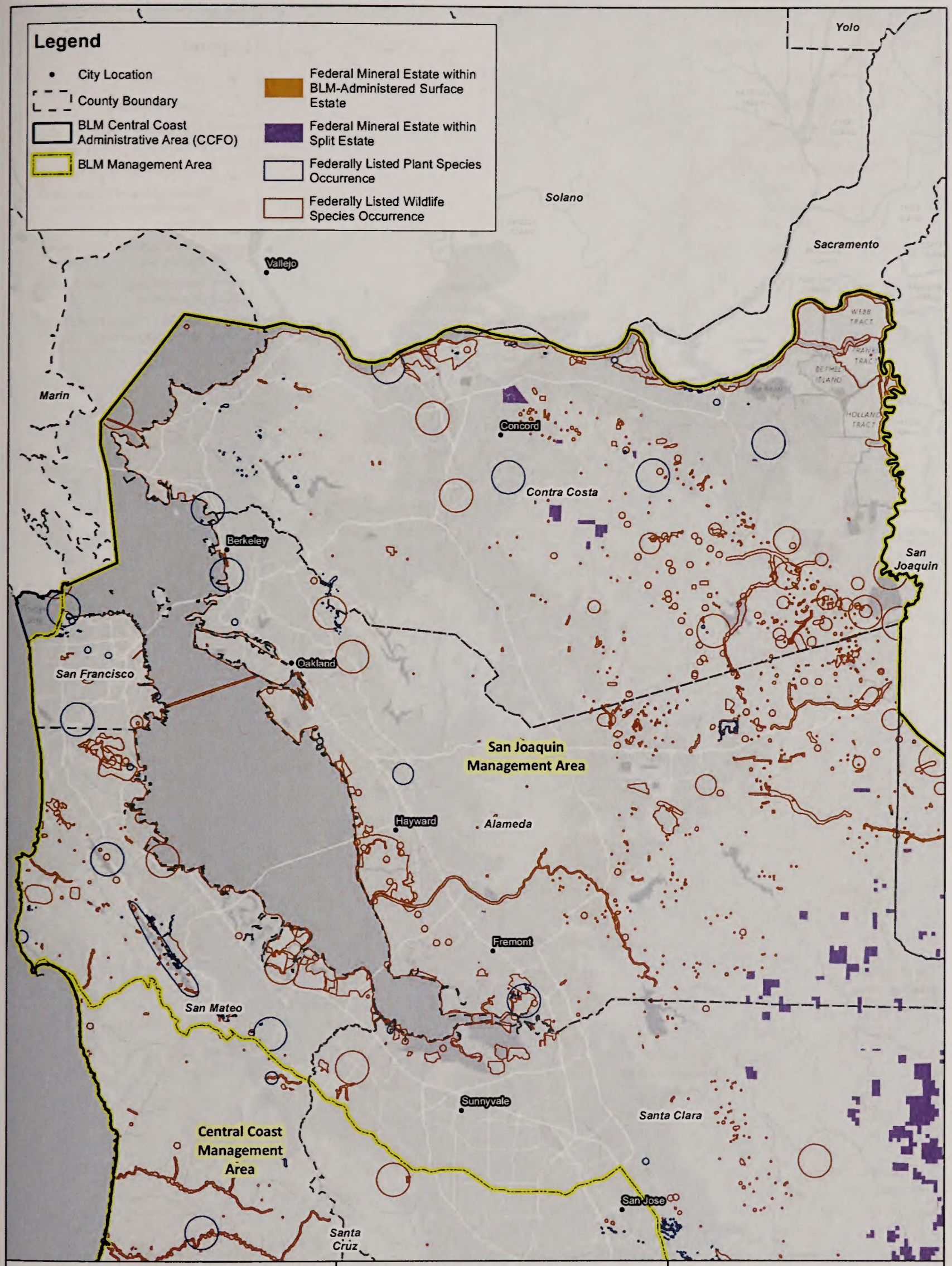
BUREAU OF LAND MANAGEMENT

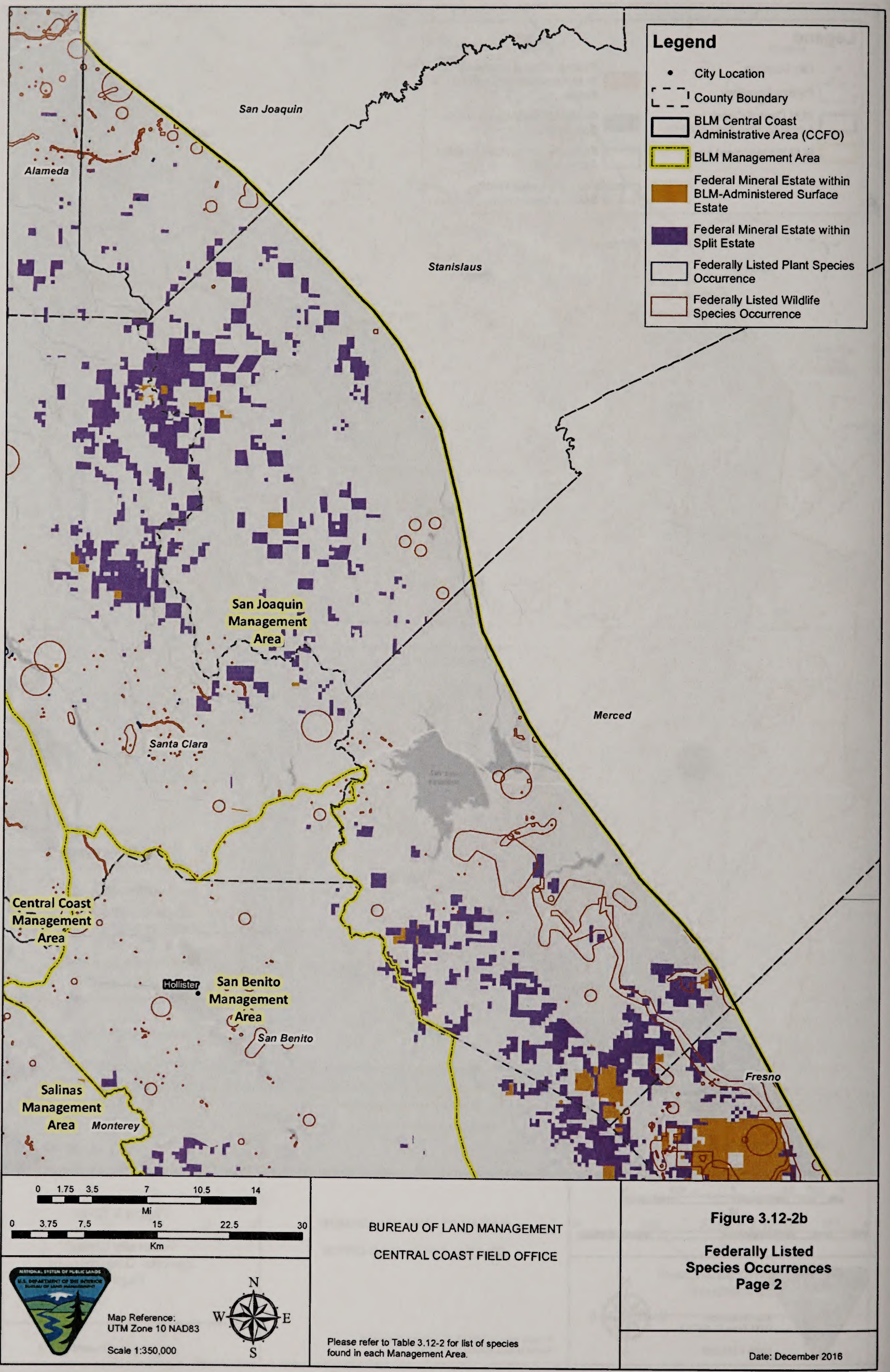
CENTRAL COAST FIELD OFFICE

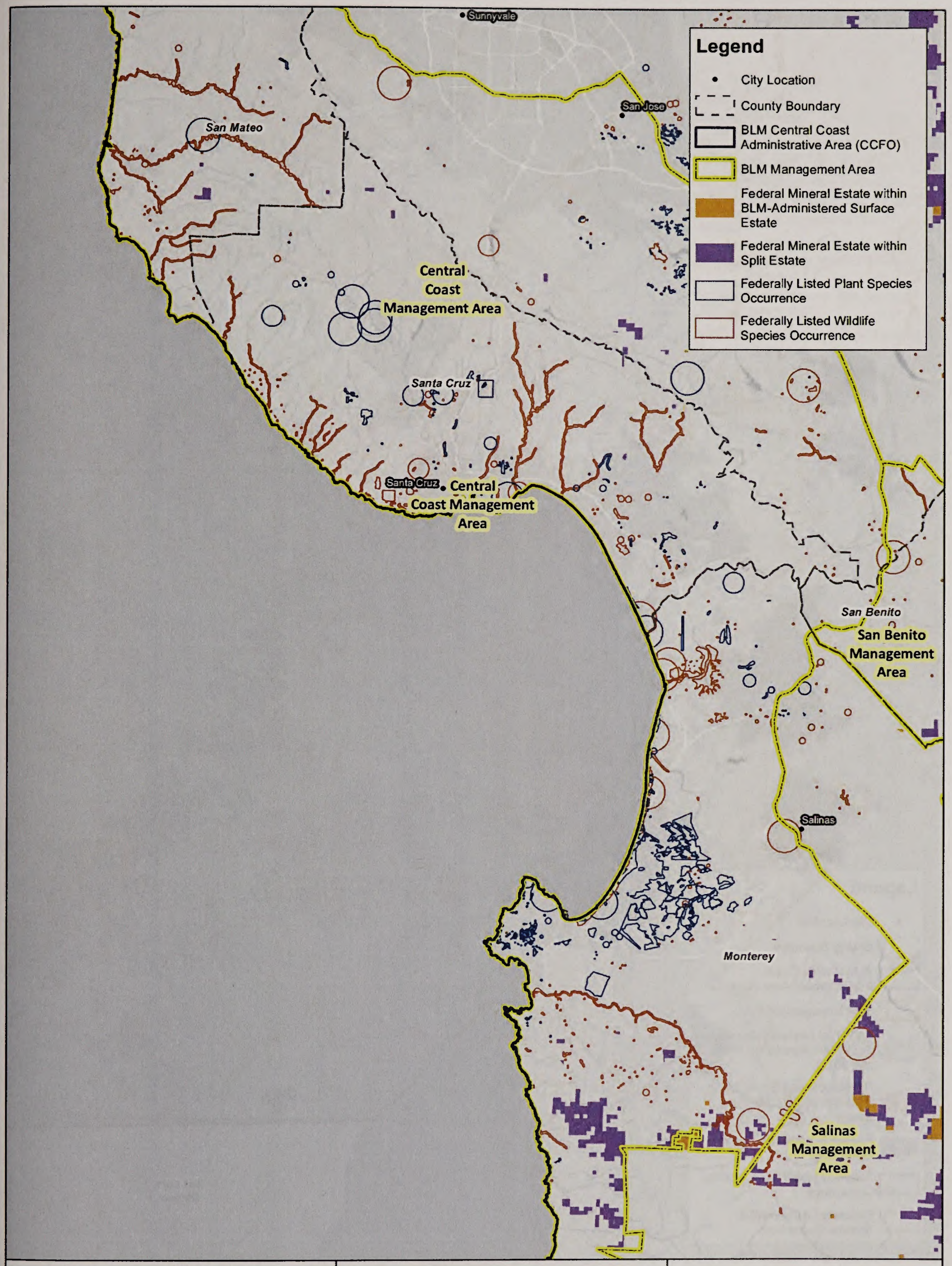
Figure 3.12-1b

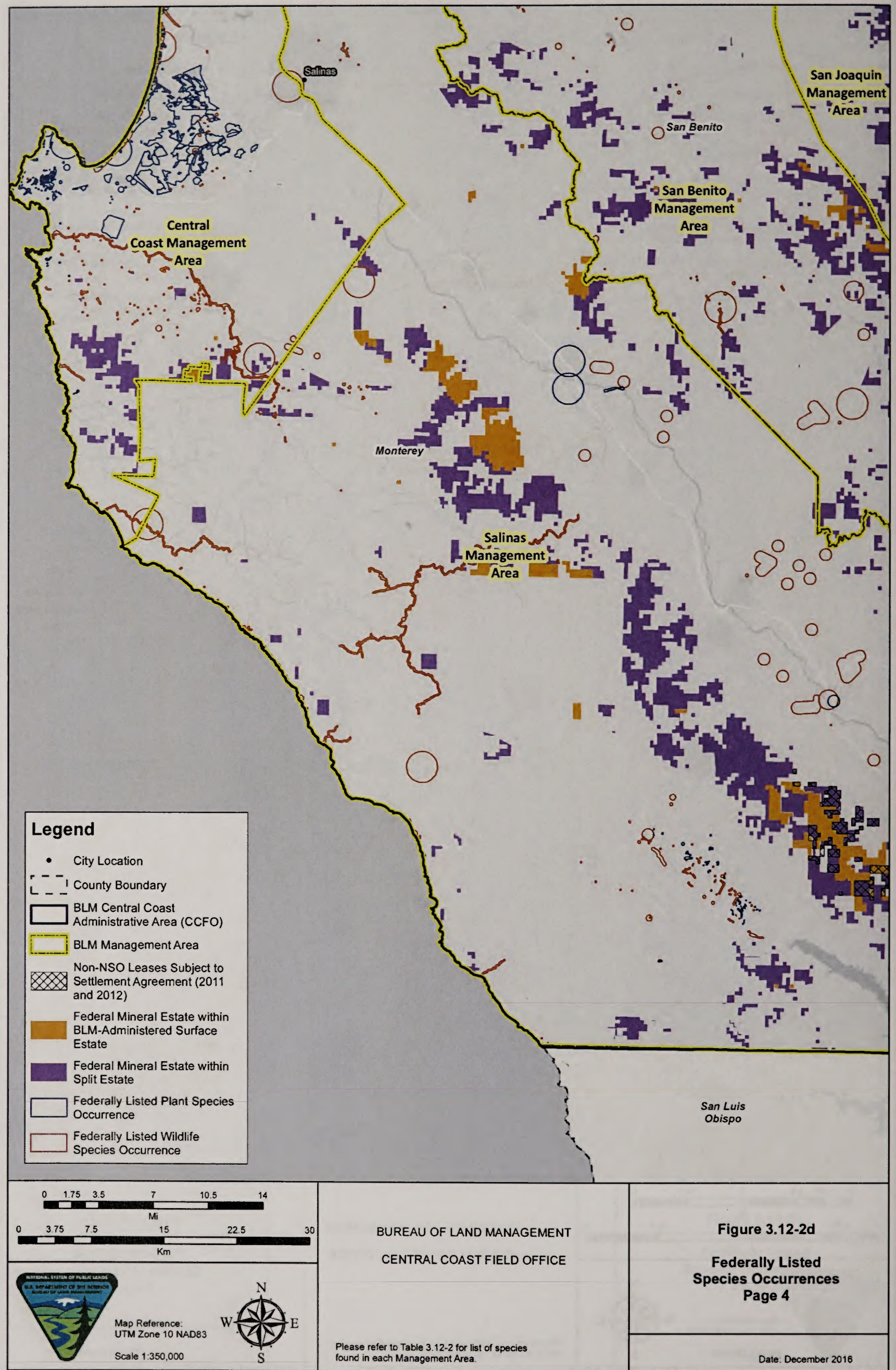
Designated Critical Habitat Southern Section

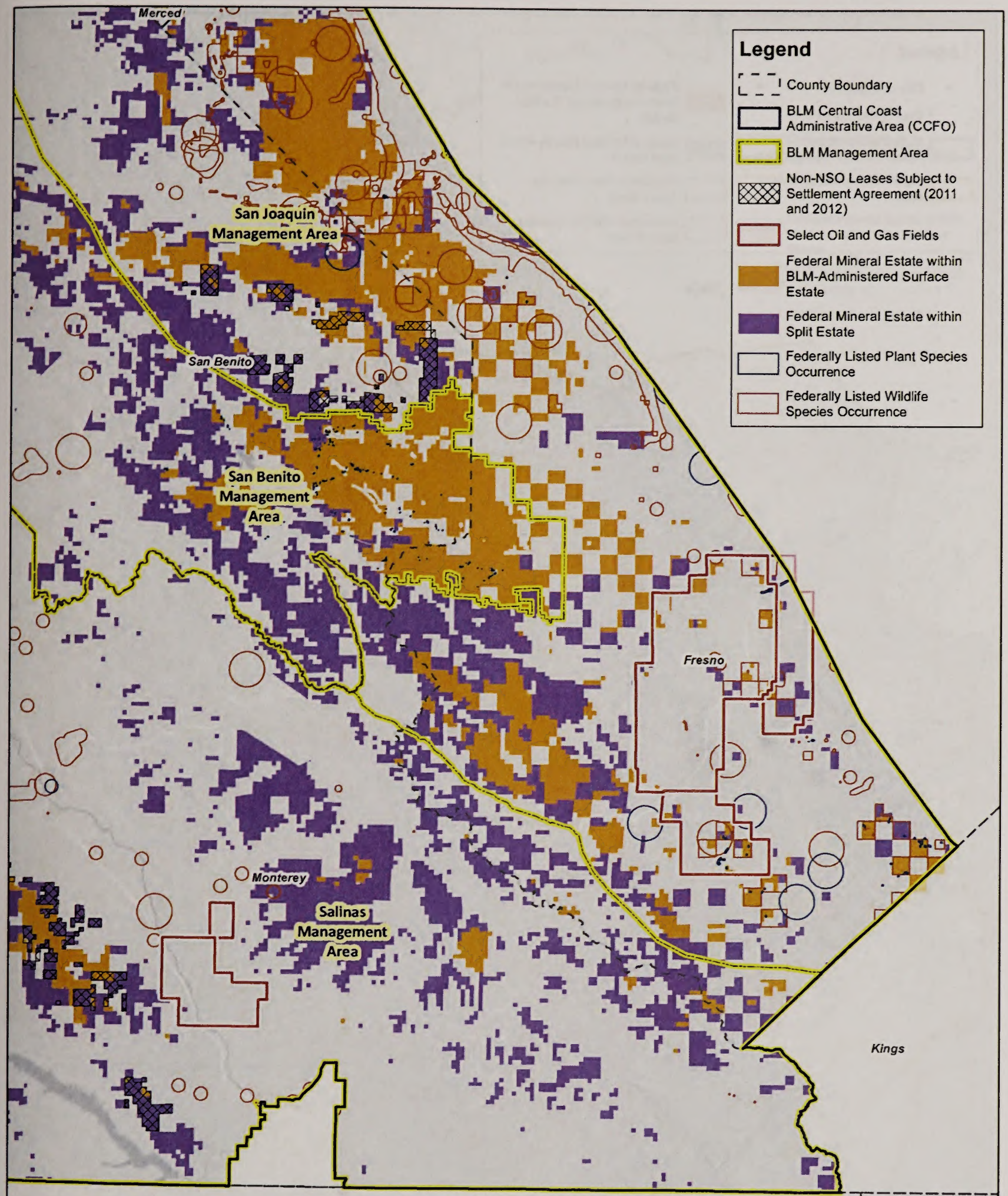
Date: December 2016


Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Management Area
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Federally Listed Plant Species Occurrence
Federally Listed Wildlife Species Occurrence
Yolo
Solano
Sacramento
Vallejo
Marin
Concord
Contra Costa
Berkeley
San Joaquin
Oakland
San Francisco
San Joaquin Management Area
Hayward
Alameda
Fremont
San Mateo
Sunnyvale
Santa Clara
Central Coast Management Area
San Jose
Santa Cruz
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table 3.12-2 for list of species found in each Management Area.
Figure 3.12-2a
Federally Listed Species Occurrences
Page 1
Date: December 2016


Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Management Area
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Federally Listed Plant Species Occurrence
Federally Listed Wildlife Species Occurrence
San Joaquin
Alameda
Stanislaus
Merced
Santa Clara
San Joaquin Management Area
Central Coast Management Area
Hollister
San Benito Management Area
San Benito
Salinas Management Area
Monterey
Fresno
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table 3.12-2 for list of species found in each Management Area.
Figure 3.12-2b
Federally Listed Species Occurrences Page 2
Date: December 2016


Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Management Area
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Federally Listed Plant Species Occurrence
Federally Listed Wildlife Species Occurrence
Sunnyvale
San Jose
San Mateo
Central Coast Management Area
Santa Cruz
Santa Cruz
Central Coast Management Area
San Benito
San Benito Management Area
Salinas
Monterey
Salinas Management Area
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table 3.12-2 for list of species found in each Management Area.
Figure 3.12-2c
Federally Listed Species Occurrences
Page 3
Date: December 2016


Salinas
San Joaquin Management Area
San Benito
San Benito Management Area
Central Coast Management Area
Monterey
Salinas Management Area
San Luis Obispo
Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Management Area
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Federally Listed Plant Species Occurrence
Federally Listed Wildlife Species Occurrence
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table 3.12-2 for list of species found in each Management Area.
Figure 3.12-2d
Federally Listed Species Occurrences
Page 4
Date: December 2016



0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km

Map Reference:
UTM Zone 10 NAD83

Scale 1:350,000

N
W E
S

BUREAU OF LAND MANAGEMENT

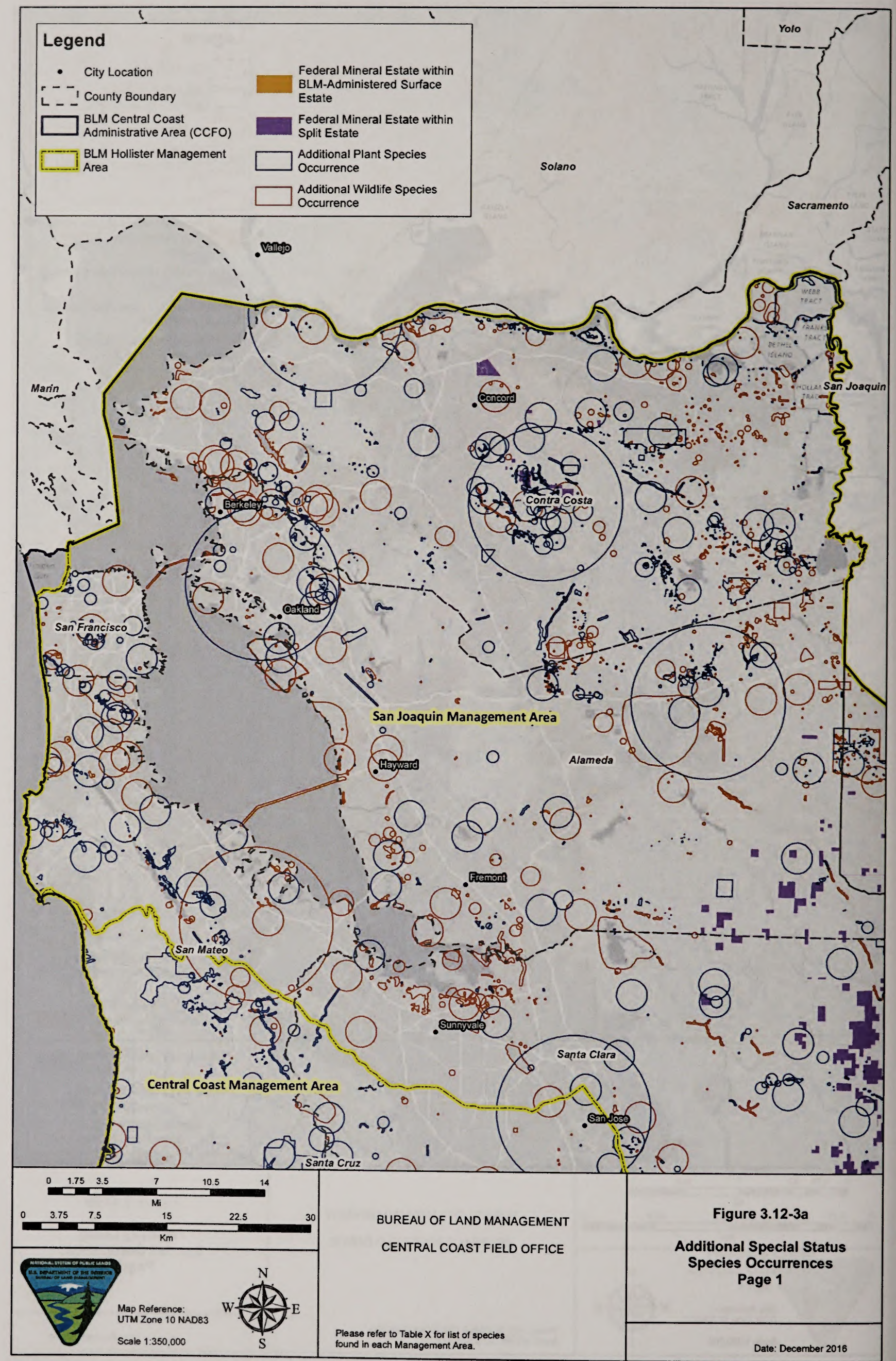
CENTRAL COAST FIELD OFFICE

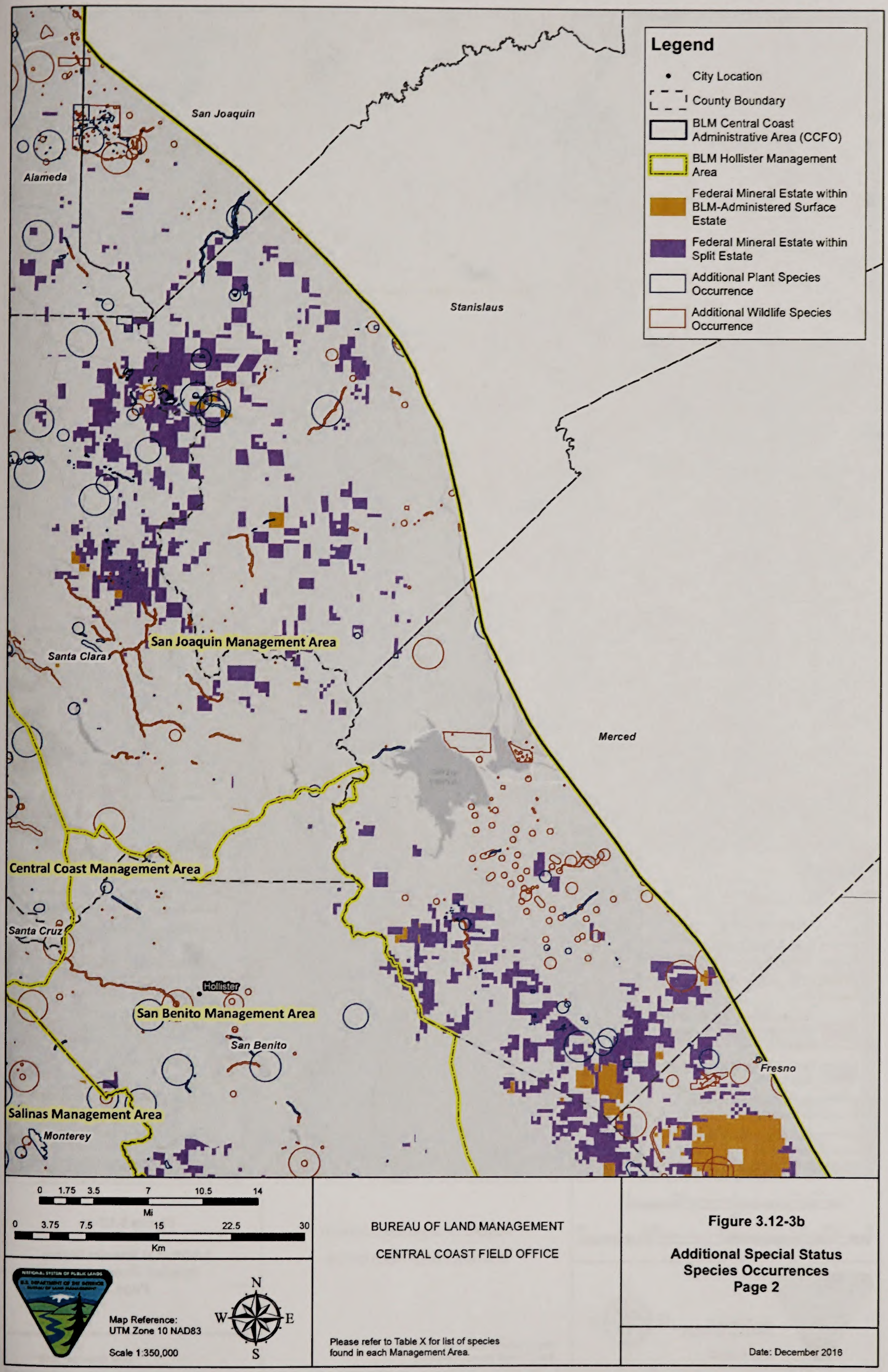
Please refer to Table 3.12-2 for list of species found in each Management Area.

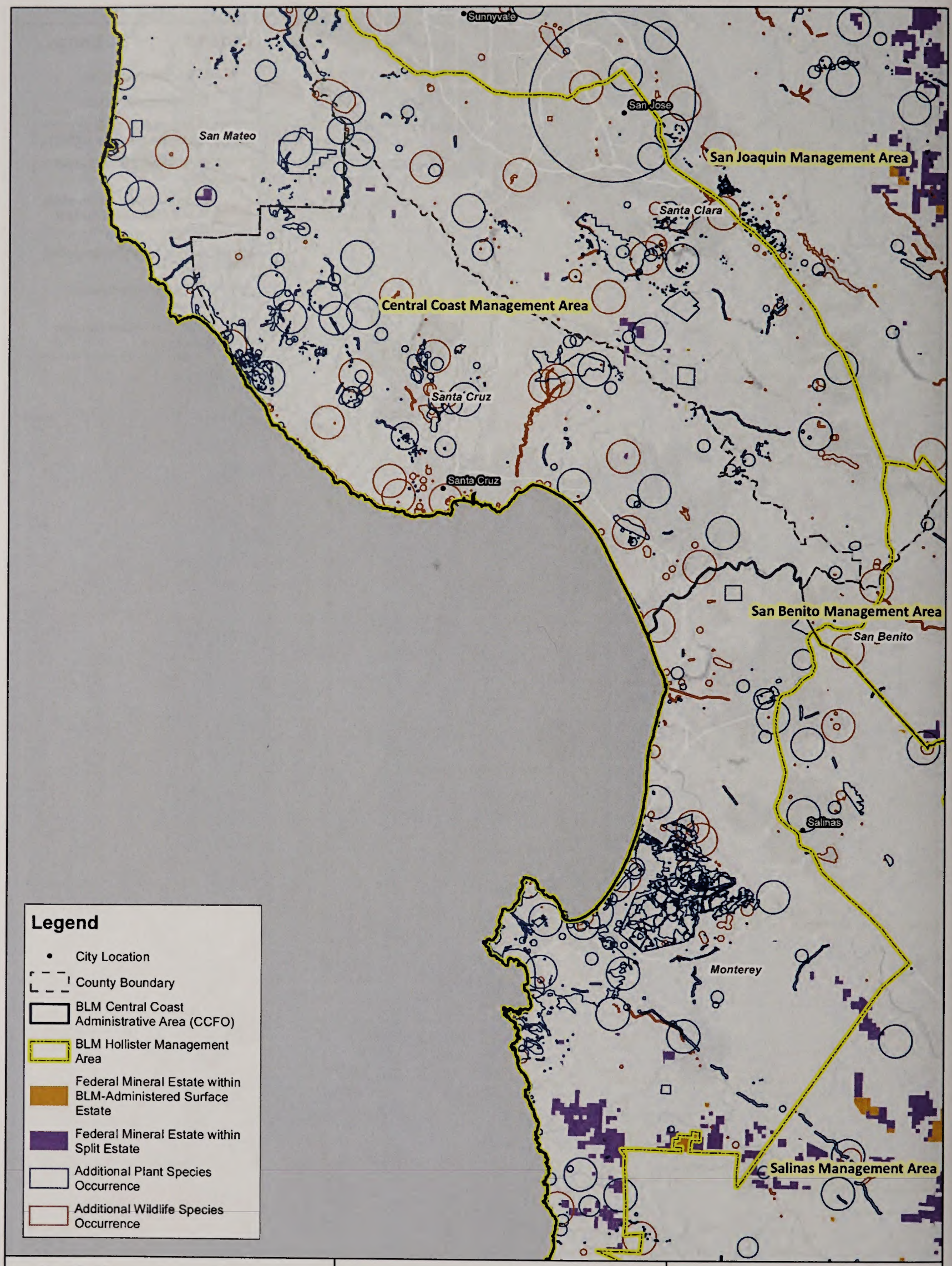
Figure 3.12-2e

Federally Listed Species Occurrences Page 5

Date: December 2016


Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Hollister Management Area
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Additional Plant Species Occurrence
Additional Wildlife Species Occurrence
Yolo
Solano
Sacramento
Vallejo
Marin
Concord
San Joaquin
Contra Costa
Berkeley
Oakland
San Francisco
San Joaquin Management Area
Hayward
Alameda
Fremont
San Mateo
Sunnyvale
Santa Clara
Central Coast Management Area
San Jose
Santa Cruz
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
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S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table X for list of species found in each Management Area.
Figure 3.12-3a
Additional Special Status Species Occurrences
Page 1
Date: December 2016


Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Hollister Management Area
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Additional Plant Species Occurrence
Additional Wildlife Species Occurrence
San Joaquin
Alameda
Stanislaus
Merced
San Joaquin Management Area
Santa Clara
Central Coast Management Area
Santa Cruz
Hollister
San Benito Management Area
San Benito
Fresno
Salinas Management Area
Monterey
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table X for list of species found in each Management Area.
Figure 3.12-3b
Additional Special Status Species Occurrences
Page 2
Date: December 2016



BUREAU OF LAND MANAGEMENT

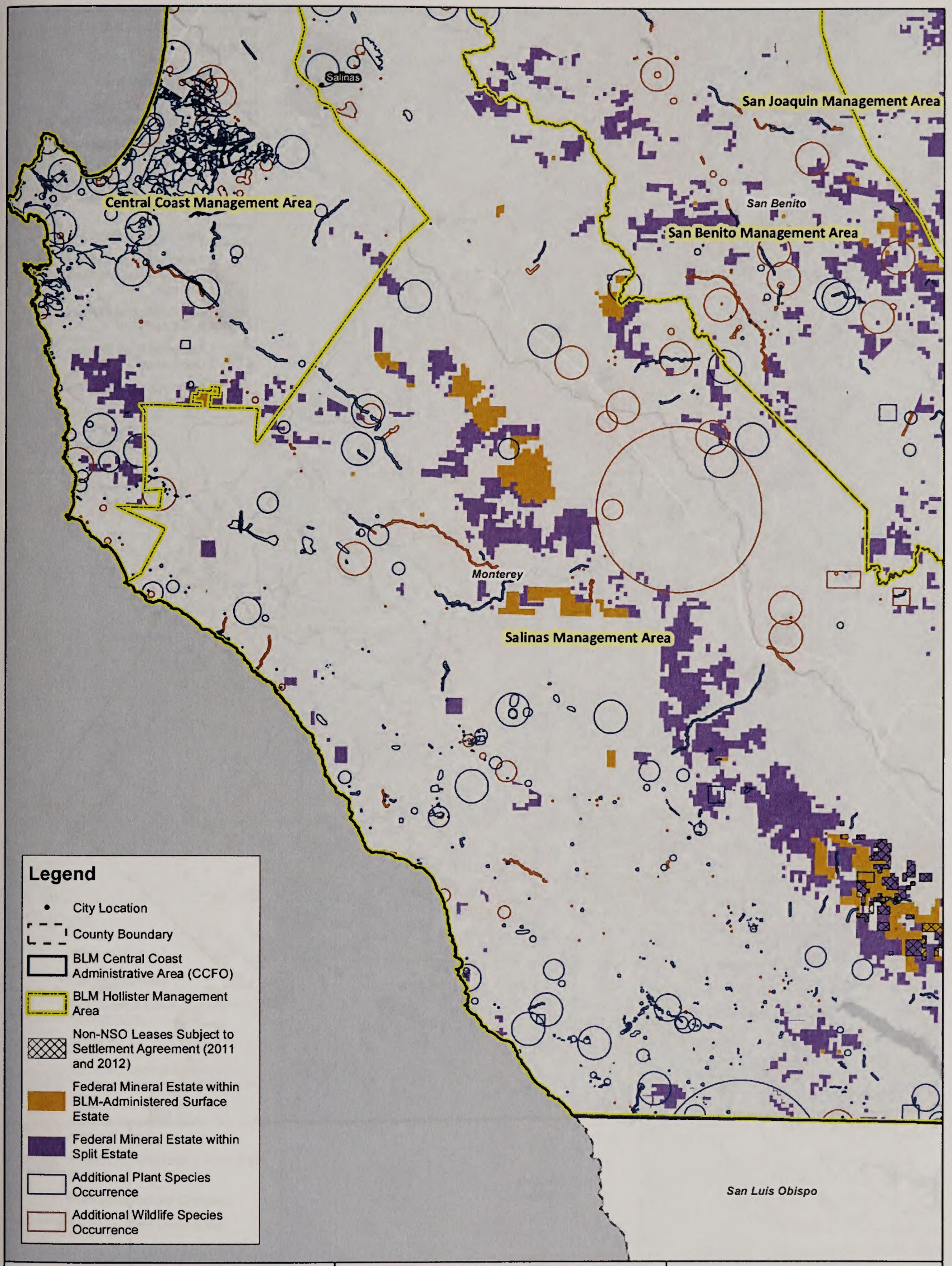
CENTRAL COAST FIELD OFFICE

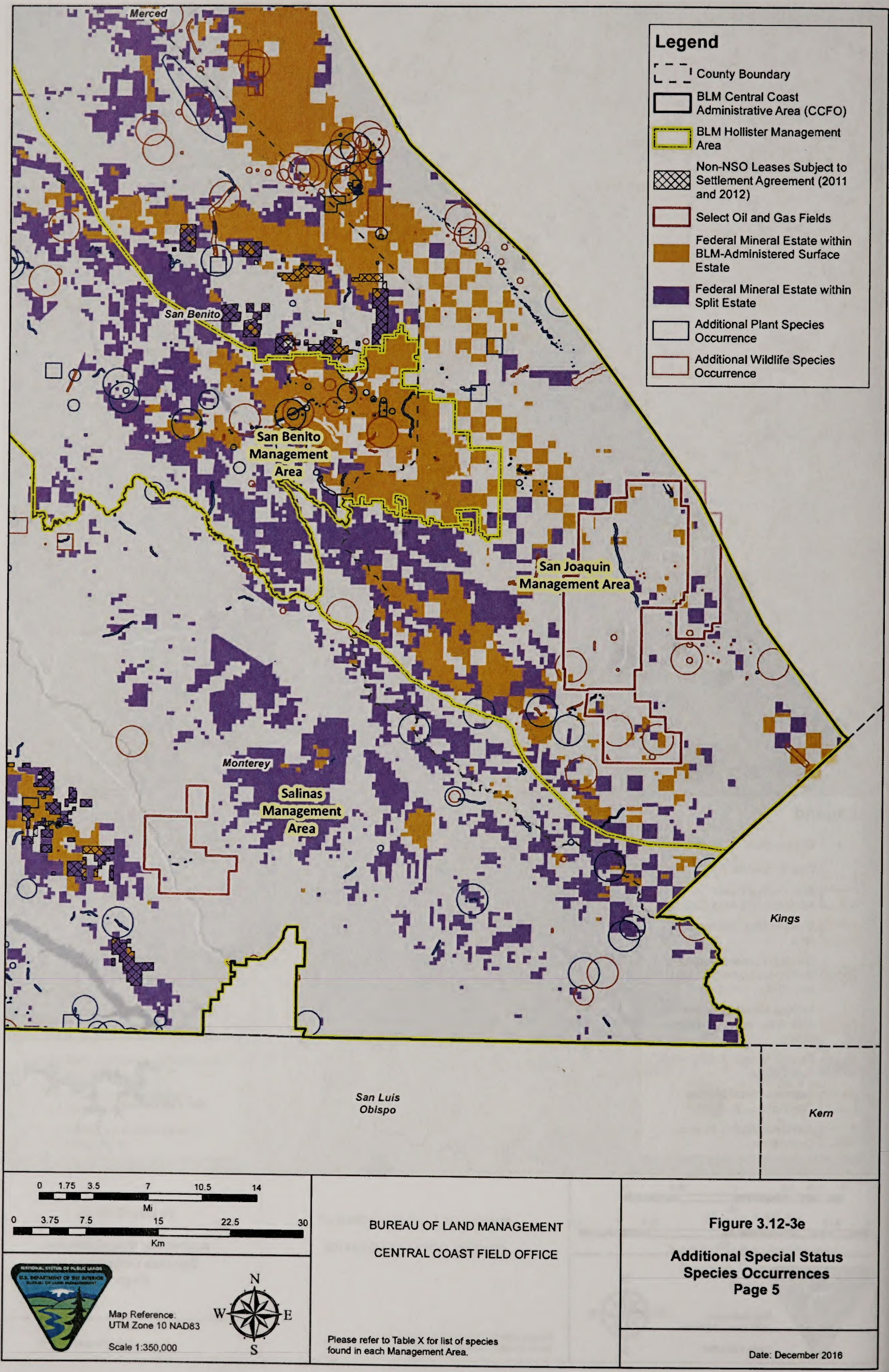
Please refer to Table X for list of species found in each Management Area.

Figure 3.12-3c

Additional Special Status Species Occurrences Page 3

Date: December 2016


Salinas
San Joaquin Management Area
Central Coast Management Area
San Benito
San Benito Management Area
Monterey
Salinas Management Area
San Luis Obispo
Legend
City Location
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Hollister Management Area
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Additional Plant Species Occurrence
Additional Wildlife Species Occurrence
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table X for list of species found in each Management Area.
Figure 3.12-3d
Additional Special Status Species Occurrences
Page 4
Date: December 2016


Merced
San Benito
San Benito Management Area
San Joaquin Management Area
Monterey
Salinas Management Area
Kings
San Luis Obispo
Kern
Legend
County Boundary
BLM Central Coast Administrative Area (CCFO)
BLM Hollister Management Area
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Select Oil and Gas Fields
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Additional Plant Species Occurrence
Additional Wildlife Species Occurrence
0 1.75 3.5 7 10.5 14
Mi
0 3.75 7.5 15 22.5 30
Km
Map Reference:
UTM Zone 10 NAD83
Scale 1:350,000
N
W
E
S
BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Please refer to Table X for list of species found in each Management Area.
Figure 3.12-3e
Additional Special Status Species Occurrences
Page 5
Date: December 2016

showy golden madia
Hall's tarplant
showy golden madia
Panoche pepper-grass
San Benito
round-leaved filaree
pale-yellow layia
Hall's tarplant
Panoche pepper-grass
Diablo Range hare-leaf
San Benito fritillary
prostrate vernal pool navarretia
round-leaved filaree
San Benito evening-primrose
stinkbells
indian Valley bush mallow
Fresno
Coalinga
Jacalitos
Carmel Valley bush-mallow
Monterey
Lynch Canyon
San Antonio collinsia
straight-awned spineflower
San Ardo
San Antonio collinsia
pale-yellow layia
Jolon clarkia
San Luis Obispo
Sonoma
Solano
Sacramento
Calaveras
Marin
Contra Costa
San Joaquin
Tuolumne
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
Area of detail
San Benito
Fresno
Monterey
Kings
San Luis Obispo
Kern

Legend

- City Location
- County Boundary
- BLM Central Coast Administrative Area (CCFO)
- Select Oil and Gas Fields
- Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
- Federal Mineral Estate within BLM-Administered Surface Estate
- Federal Mineral Estate within Split Estate
- Rare Plant Record (Calflora)
- Sensitive Plant Occurrence (CNDDB)

0 2 4 8 12 16
Mi
0 4.25 8.5 17 25.5 34
Km

Map Reference:
UTM Zone 10 NAD83

Scale 1:400,000

N
W E
S

BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 3.12-4

Special Status Plant Occurrences within One-Mile of Leases Subject to Litigation

Date: December 2016

western pond turtle

giant kangaroo rat

San Joaquin kit fox

western mastiff bat

giant kangaroo rat

San Joaquin kit fox

Nelson's antelope squirrel

coast horned lizard

blunt-nosed leopard lizard

foothill yellow-legged frog

San Benito

Fresno

Coalinga

Jacalitos

Monterey

Monterey dusky-footed woodrat

Lynch Canyon

San Ardo

San Joaquin kit fox

Kings

San Luis Obispo

Legend

- County Boundary
- BLM Central Coast Administrative Area (CCFO)
- Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
- Select Oil and Gas Fields
- Federal Mineral Estate within BLM-Administered Surface Estate
- Federal Mineral Estate within Split Estate
- Sensitive Animal Occurrence



0 2 4 8 12 16

Mi

0 4.25 8.5 17 25.5 34

Km

Map Reference:
UTM Zone 10 NAD83

Scale 1:400,000

N

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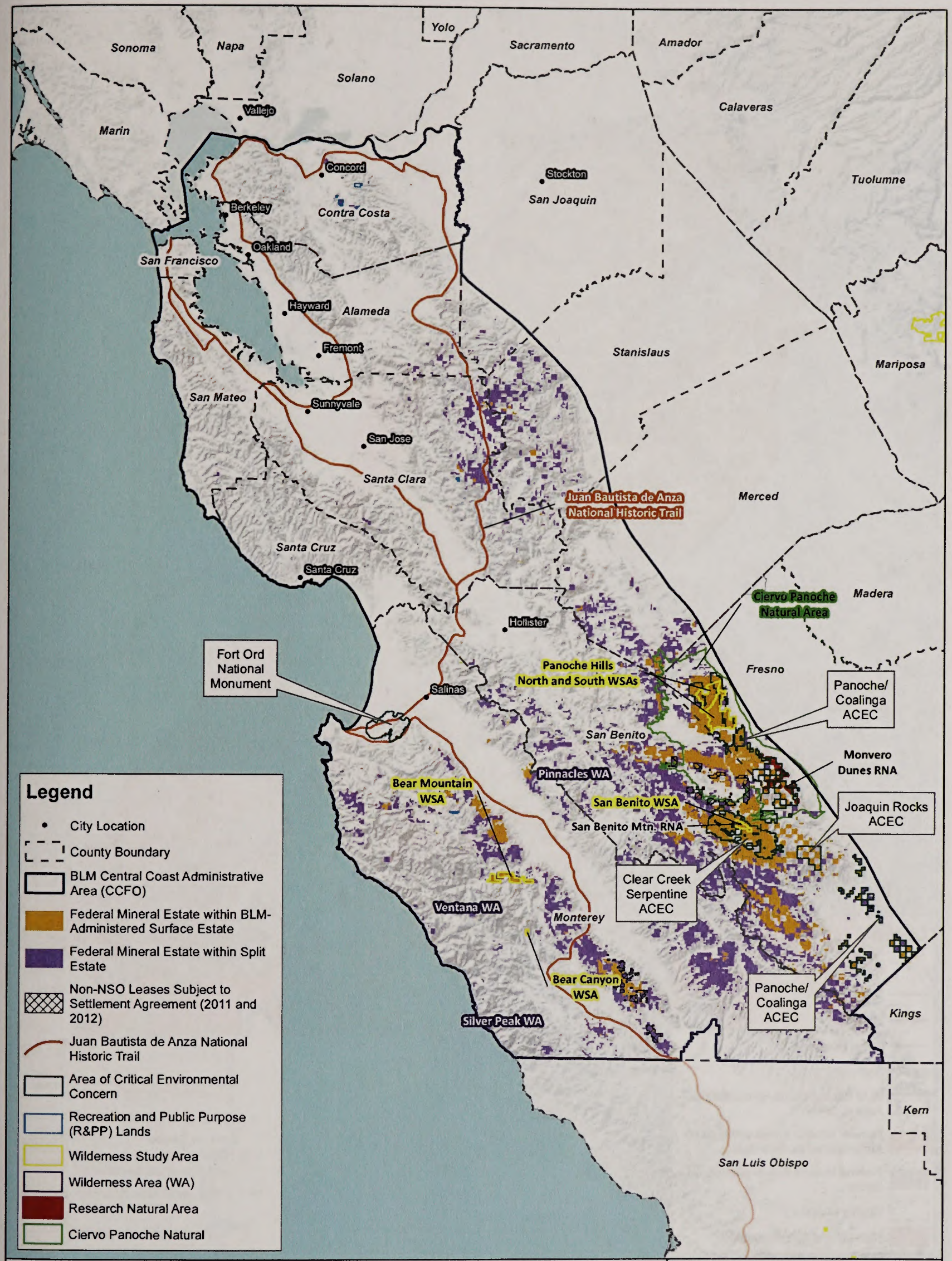
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 3.12-5

Special Status Wildlife Occurrences within One-Mile of Leases Subject to Litigation

Date: December 2016



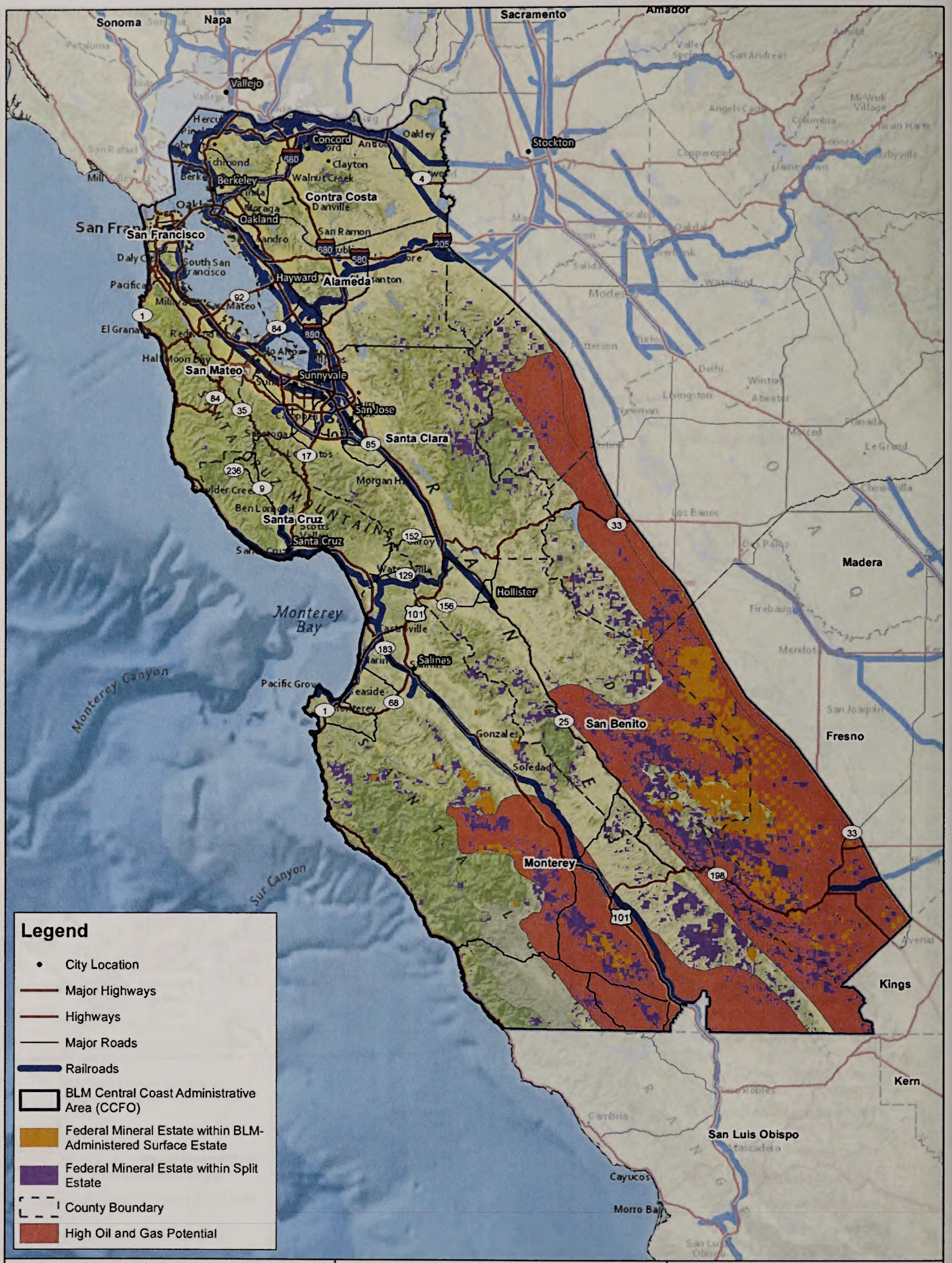
BUREAU OF LAND MANAGEMENT

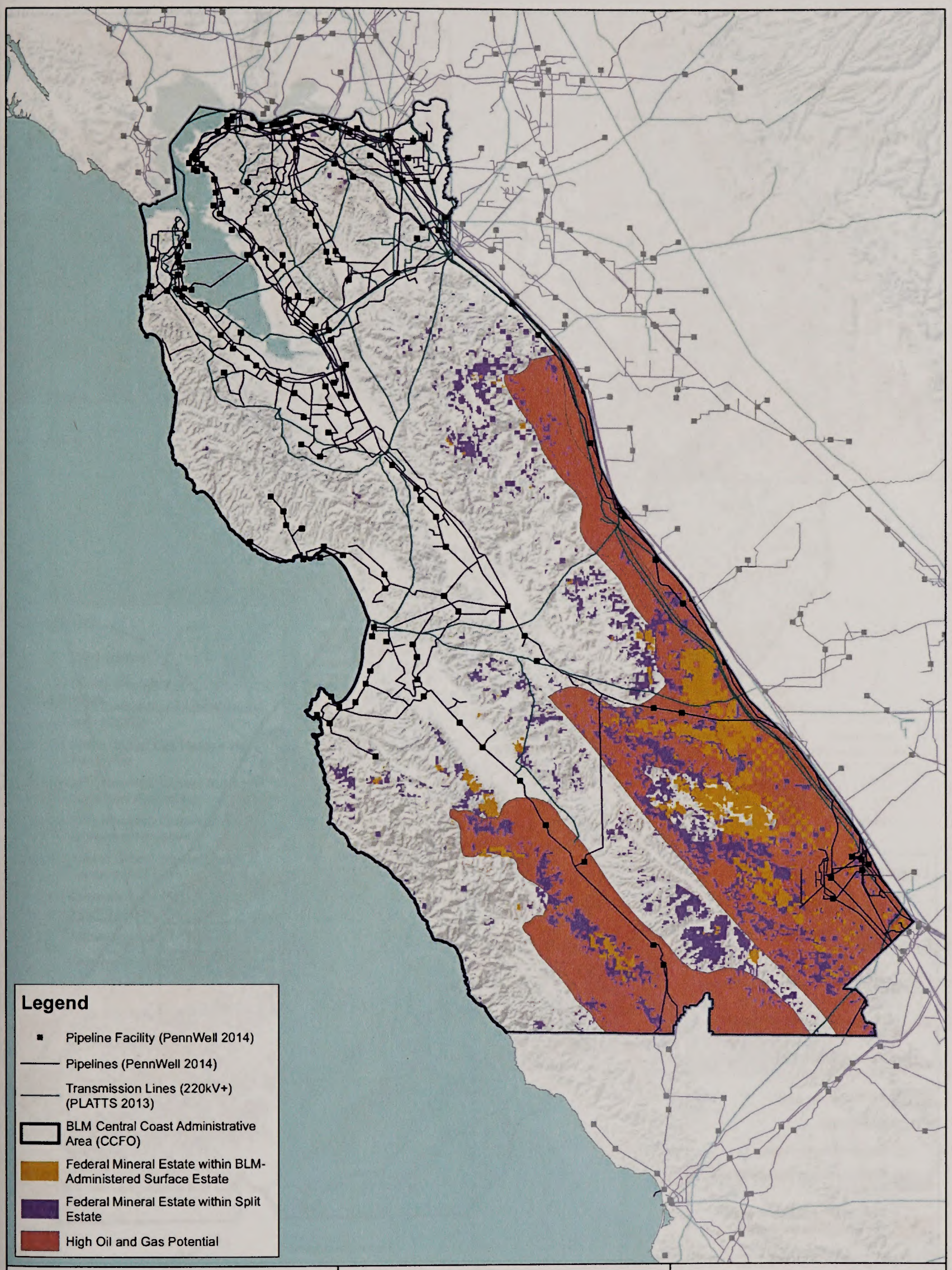
CENTRAL COAST FIELD OFFICE

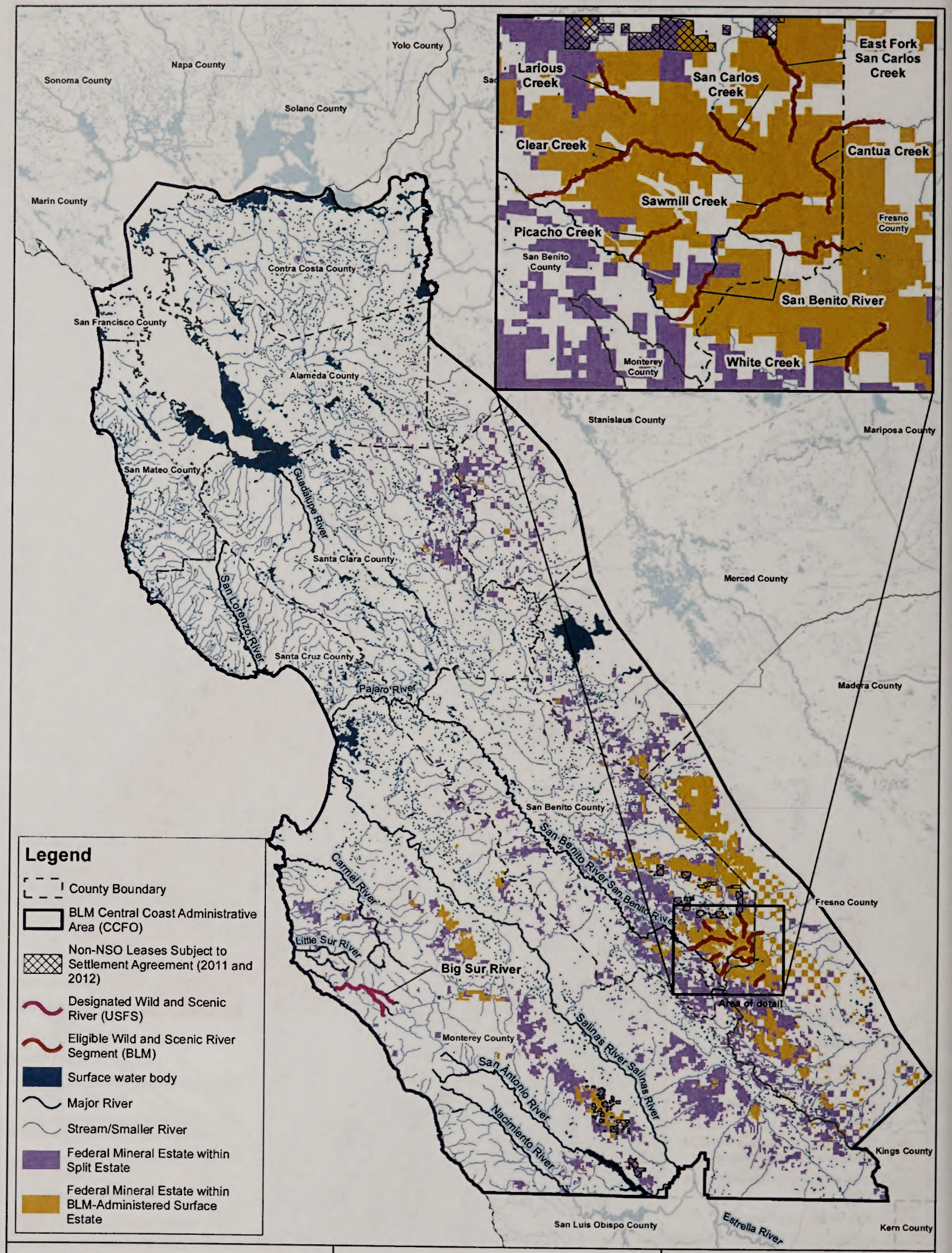
Figure 3.14-1

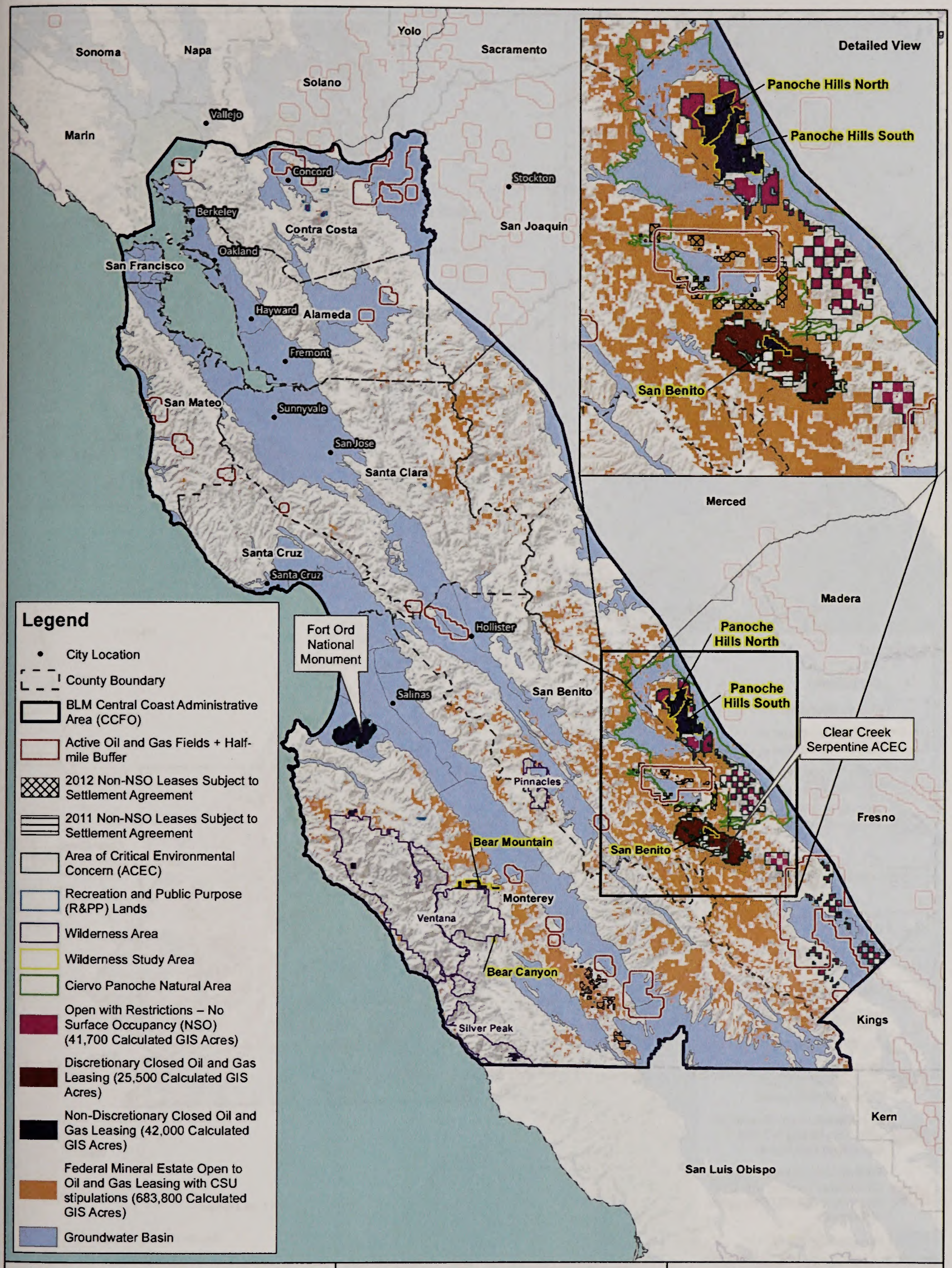
Special Management Areas within the BLM Central Coast Field Office Administrative Area

Date: December 2016


Sonoma
Napa
Sacramento
Amador
Vallejo
Concord
Oakley
Stockton
Clayton
Walnut Creek
Berkeley
Contra Costa
Danville
Oakland
San Francisco
San Ramon
Hayward
Alameda
San Mateo
Sunnyvale
San Jose
Santa Clara
Santa Cruz
Hollister
Monterey Bay
Salinas
Pacific Grove
Monterey
Gonzales
Soledad
San Benito
Madera
Fresno
Kings
Kern
San Luis Obispo
Cayucos
Morro Bay
Monterey Canyon
Sur Canyon
SANTA CRUZ MOUNTAINS
SALINAS VALLEY
SAN JOAQUIN VALLEY
Legend
City Location
Major Highways
Highways
Major Roads
Railroads
BLM Central Coast Administrative Area (CCFO)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
County Boundary
High Oil and Gas Potential
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.18-1
Regional
Transportation Network
Date: December 2016


Legend
Pipeline Facility (PennWell 2014)
Pipelines (PennWell 2014)
Transmission Lines (220kV+) (PLATTS 2013)
BLM Central Coast Administrative Area (CCFO)
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
High Oil and Gas Potential
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.20-1
Existing Pipelines and Transmission Lines
Date: December 2016


Yolo County
Napa County
Sonoma County
Solano County
Marin County
Contra Costa County
San Francisco County
Alameda County
San Mateo County
Santa Clara County
Santa Cruz County
Guadalupe River
San Lorenzo River
Pajaro River
Stanislaus County
Mariposa County
Merced County
Madera County
San Benito County
Monterey County
San Luis Obispo County
Fresno County
Kings County
Kern County
Carmel River
Little Sur River
Big Sur River
Salinas River
San Antonio River
Nacimiento River
San Benito River
Area of detail
Larious Creek
San Carlos Creek
East Fork San Carlos Creek
Clear Creek
Cantua Creek
Sawmill Creek
Picacho Creek
San Benito River
White Creek
Legend
County Boundary
BLM Central Coast Administrative Area (CCFO)
Non-NSO Leases Subject to Settlement Agreement (2011 and 2012)
Designated Wild and Scenic River (USFS)
Eligible Wild and Scenic River Segment (BLM)
Surface water body
Major River
Stream/Smaller River
Federal Mineral Estate within Split Estate
Federal Mineral Estate within BLM-Administered Surface Estate
0 5 10 20 30 40
Mi
0 5 10 20 30 40
Km
Source: BLM, 2015
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 3.21-1
Wild and Scenic Rivers
Date: December 2016



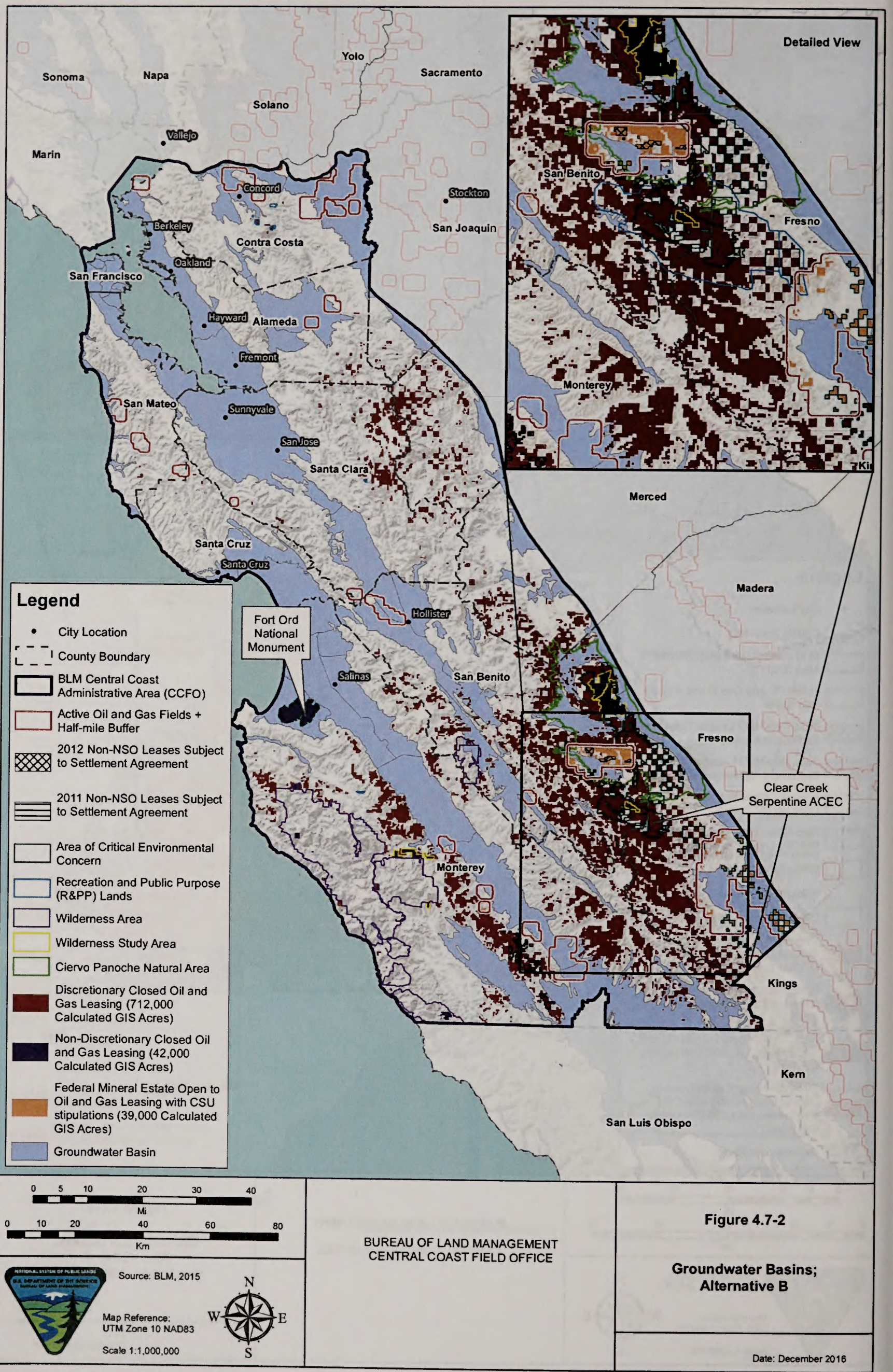
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 4.7-1

Groundwater Basins; Alternative A (No Action Alternative)

Date: December 2016

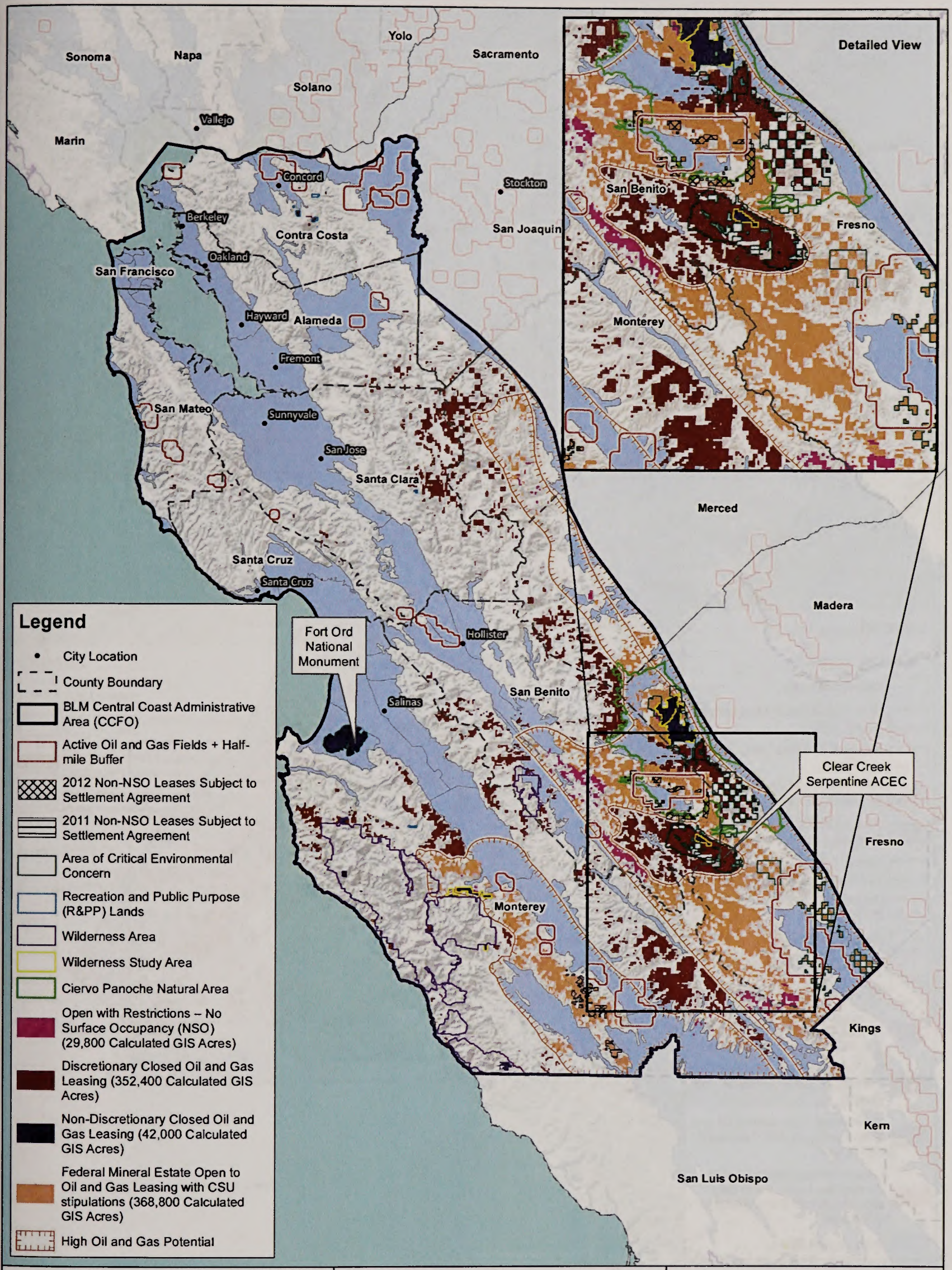


BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE

Figure 4.7-2

Groundwater Basins; Alternative B

Date: December 2016



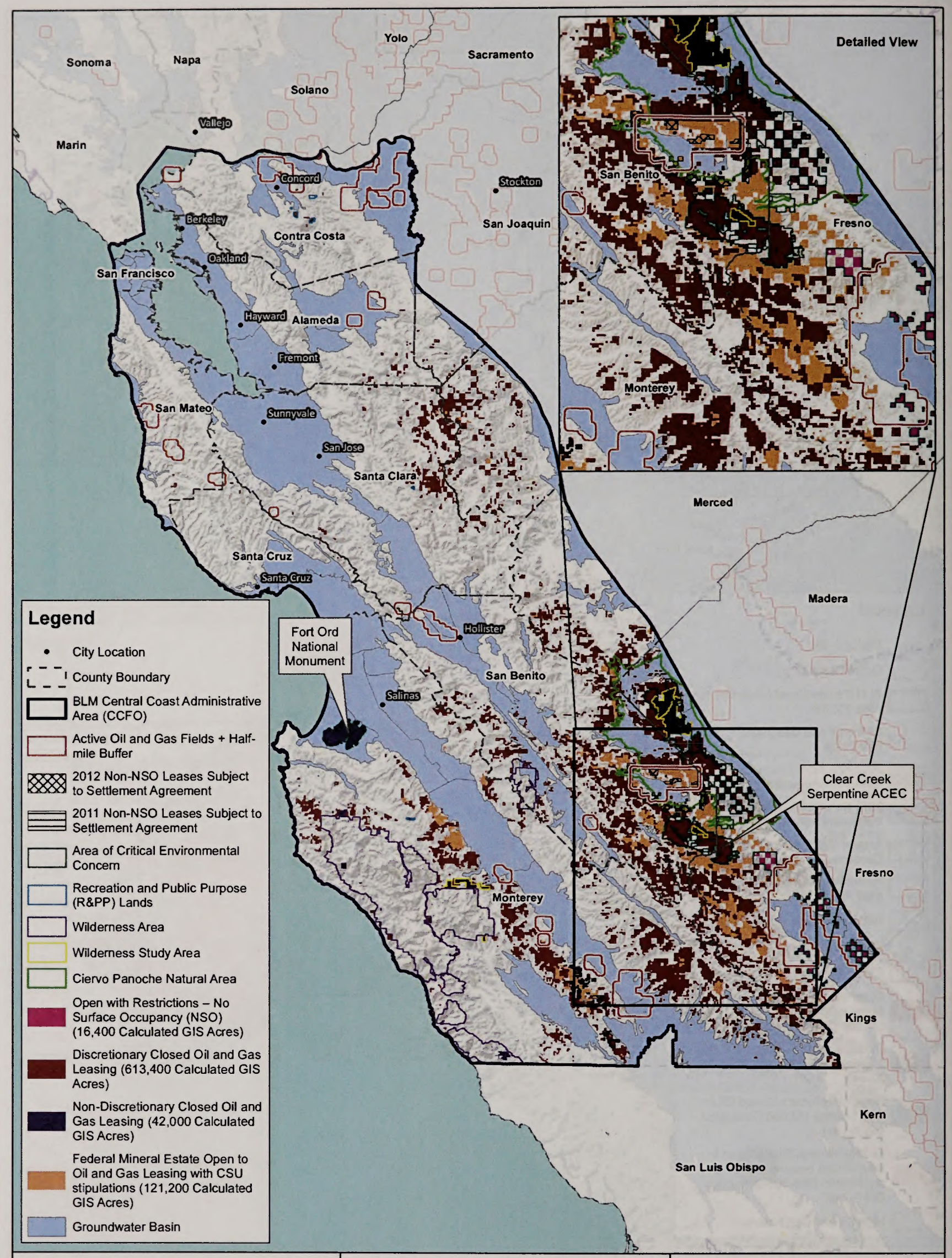
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 4.7-3

Groundwater Basins; Alternative C

Date: December 2016



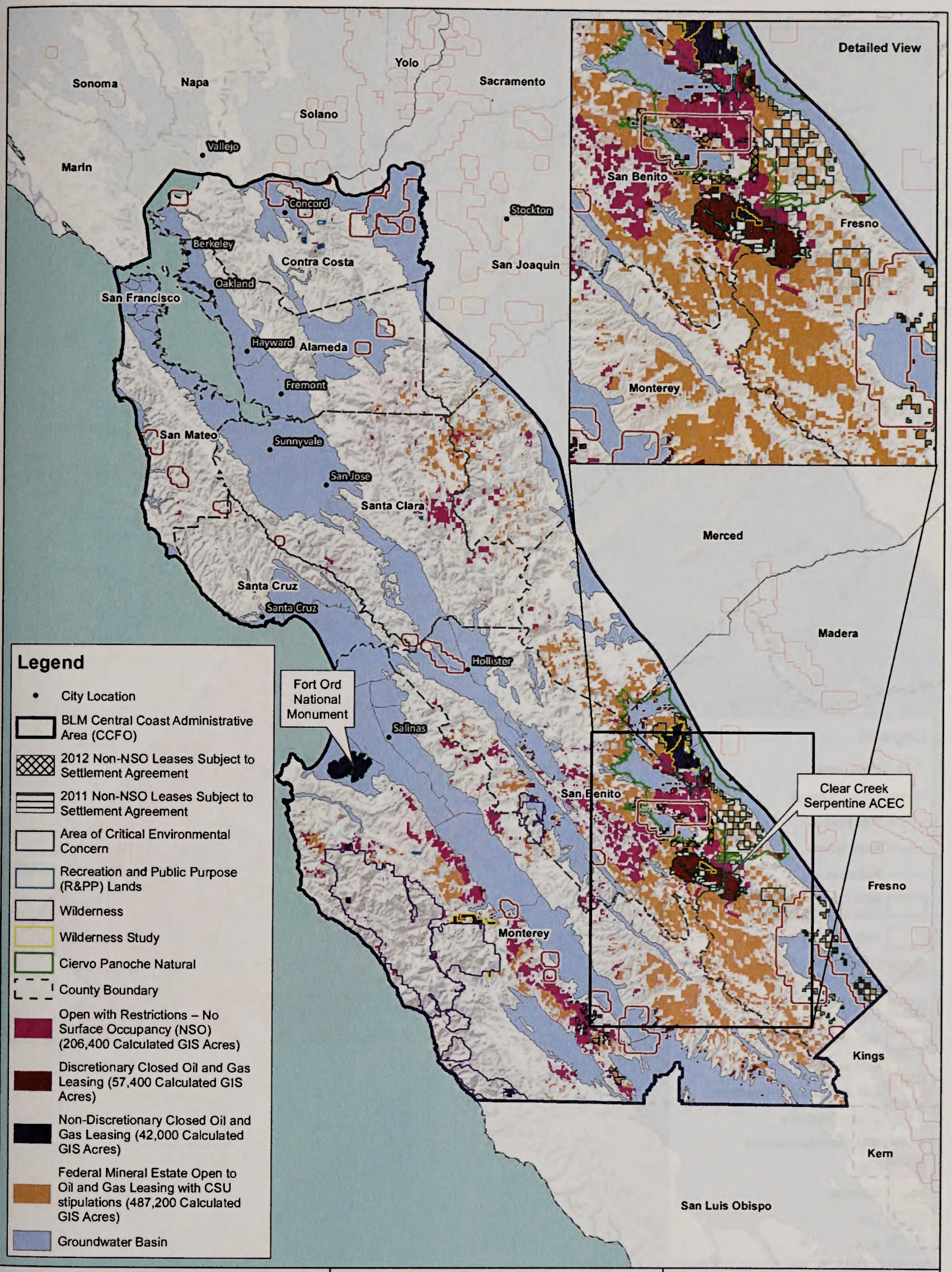
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 4.7-4

Groundwater Basins; Alternative D

Date: December 2016



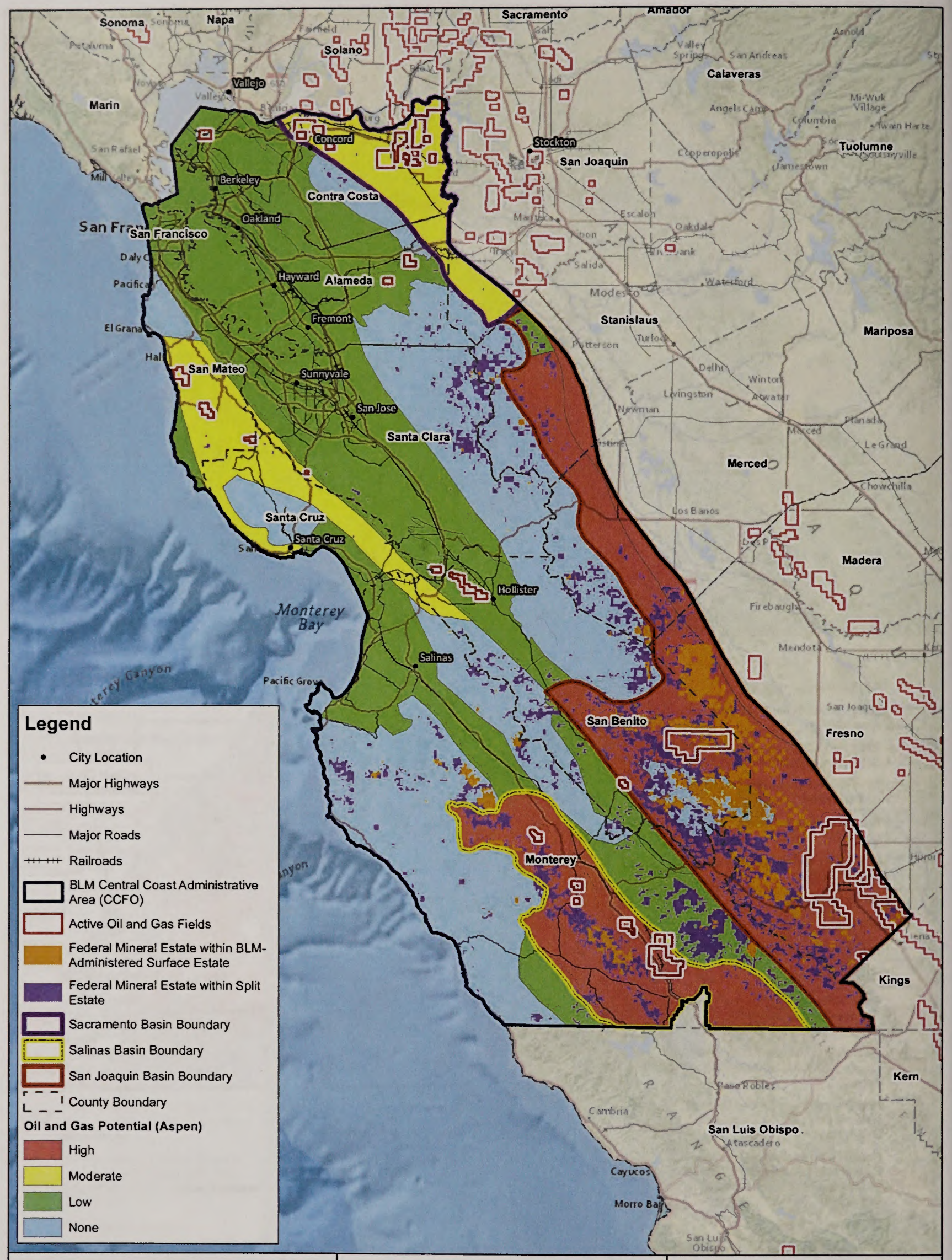
BUREAU OF LAND MANAGEMENT

CENTRAL COAST FIELD OFFICE

Figure 4.7-5

Groundwater Basins; Alternative E

Date: December 2016


Sonoma
Napa
Solano
Sacramento
Amador
Calaveras
Tuolumne
Marin
Vallejo
Concord
Stockton
San Joaquin
Berkeley
Contra Costa
Oakland
San Francisco
Hayward
Alameda
Fremont
Stanislaus
Mariposa
San Mateo
Sunnyvale
San Jose
Santa Clara
Merced
Santa Cruz
Madera
Hollister
Monterey Bay
Salinas
San Benito
Fresno
Monterey
Kings
Kern
San Luis Obispo
Cayucos
Morro Bay
Legend
City Location
Major Highways
Highways
Major Roads
Railroads
BLM Central Coast Administrative Area (CCFO)
Active Oil and Gas Fields
Federal Mineral Estate within BLM-Administered Surface Estate
Federal Mineral Estate within Split Estate
Sacramento Basin Boundary
Salinas Basin Boundary
San Joaquin Basin Boundary
County Boundary
Oil and Gas Potential (Aspen)
High
Moderate
Low
None
0 5 10 20 30 40
Mi
0 10 20 40 60 80
Km
Source: BLM, 2015
Map Reference:
UTM Zone 10 NAD83
Scale 1:1,000,000
N
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BUREAU OF LAND MANAGEMENT
CENTRAL COAST FIELD OFFICE
Figure 5-1
Reasonably Foreseeable Oil and Gas Development Potential
Date: December 2016

Appendix B

Reasonably Foreseeable Development Scenario for Oil and Gas

Appendix B.
Hollister Field Office Area – Reasonably Foreseeable Development Scenario for Oil and Gas

This section describes the Reasonably Foreseeable Development Scenario (RFDS) for oil and gas in the Hollister Field Office[1] (HFO) area. It estimates the level and type of future oil and gas activity in the planning area for analysis of the Resource Management Plan (RMP) Amendment and provides a basis for the analysis of cumulative effects. For this RFDS, "reasonably foreseeable" is defined as projected to occur based on development trends in the HFO area in recent years and is based on a reasonable, technical, and scientific estimate of anticipated oil and gas activity based on the best available information and data at the time of the study (Instruction Memorandum (IM) No. 2004-089 "Policy for Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas," dated January 16, 2004). Reasonably foreseeable does not include scenarios that are merely speculative or only have a remote possibility of occurring. This RFDS has been updated[2] from the Bureau of Land Management's (BLM's) HFO RFDS for Oil and Gas, which was included as Appendix F in the Record of Decision for the RMP for the Southern Diablo Mountain Range and Central Coast of California, to include new information based on oil and gas drilling technologies, including well stimulation, and recent oil and gas development trends in California. Based on current regulations and the range of projected activity on federal mineral estate within the planning area, this RFDS is applicable regardless of which of the alternatives analyzed in the EIS is chosen as the Preferred Alternative.

The RFDS first describes the steps involved in exploring for and developing deposits of oil and gas. Trends and assumptions affecting oil and gas activity are discussed, along with estimates for future oil and gas exploration and development. The RFDS is based on known or inferred oil and gas occurrence potential from California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) records, independent assessments of scientific literature, and knowledge of local experts with experience in the leasing and development of federal minerals (Milliken, 1990; USGS, 1915). The lands included are limited to those with BLM-administered minerals, including split estate with private surface estate and federal sub-surface minerals.

It should be noted that not all mineral estate managed by the BLM may have been identified at this time. For purposes of this document, all mineral estate managed by the BLM is considered covered by this RFDS, even if BLM maps do not currently show the mineral estate. Mineral estate on lands that may be acquired in the future will also be covered by this RFDS, so long as the values and resources that are contained on the newly acquired lands do not differ significantly from those on existing known federal mineral estate.

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1 The Hollister Field Office has transitioned to a new location in Marina, California, and is now called the Central Coast Field Office. In this RFDS, it is still called the Hollister Field Office.

2 This update was prompted by a court order and settlement agreement. The court in *Center for Biological Diversity v. Bureau of Land Management* found it unreasonable for BLM to "consider only a single exploratory well scenario solely based on past data" based on the record in the case. 937 F. Supp. 2d 1140, 1156 (N.D. Cal. 2013).

1. Past and Present Oil and Gas Exploration and Development

This section describes oil and gas exploration and development on BLM-administered surface and split-estate lands, as well as provides a detailed description of past and current activities throughout the entire HFO area.

The HFO area covers over 6.8 million acres, within which there are 792,430 acres of federal mineral estate (11.6 percent of the total area). As of mid-2014, there are 65 authorized oil and gas leases on federal mineral estate within the HFO covering an estimated 41,184 acres. Eighty (80) active producing and service oil and gas wells and 66 idle wells are located on federal mineral estate within the HFO. Over 99 percent of the wells in the HFO area are located within oil and gas field boundaries, with less than 1 percent being classified as wildcats (outside administrative field boundaries). Of the total 4,292 producing wells within the HFO area, the 146 wells that occur on federal authorized leases amount to BLM involvement with 3.4 percent of all current oil and gas activity within the HFO boundary. In the last two years, two Applications for Permit to Drill (APD) on existing BLM leases in the Coalinga area have been submitted to the HFO; these are the first APDs submitted to the HFO in the last 20 years.

Table 1. Hollister Field Office Planning Area, Oil and Gas Data (as of mid-2014)

	BLM HFO-Administered Public Lands	HFO Planning Area, Total
Oil and gas leases on federal mineral estate	65 leases	—
Leased land area of federal mineral estate	~41,200 acres	—
Area of existing oil and gas fields	—	204,200 acres
Area of active oil and gas fields	~28,200 acres of federal mineral estate	195,330 acres
Wells	80 active producing and service wells & 66 idle wells	4,292 wells (active) (3.4% on BLM federal mineral estate)
Federal mineral estate area	**~792,430 acres federal mineral estate** (includes ~231,050 acres of BLM-administered surface and ~561,380 acres of split estate)	**~6,820,400 acres** (11.6% is federal mineral estate)

Since the 2007 Proposed RMP and EIS, the BLM and the State of California have sponsored independent third-party extensive statewide studies of the geology of oil and gas basins and industry activities, including well stimulation treatments, such as hydraulic fracturing, acid matrix stimulation and acid fracturing. These studies improve the understanding of past and present exploration and development in the HFO area. The California Council on Science and Technology (CCST) released its Independent Scientific Assessment (ISA) on Advanced Well Stimulation Technologies in California, commissioned by the BLM, in August 2014 (CCST, 2014). In January 2015, the CCST released Volume I of the State's ISA of Well Stimulation in California, which was required by Senate Bill (SB) 4. Volume I focuses on geology and well stimulation treatments and their past, present, and potential future use in California (CCST, 2015).

The CCST Volumes II and III were released in July 2015. Volume II (Generic and Potential Environmental Impacts of Well Stimulation Treatments) assesses the potential impacts of well stimulation treatments with respect to water, air quality, and greenhouse gas emissions, as well as induced seismicity, ecology, traffic, and noise. Volume III (Case Studies with Selected Evaluations of Environmental and Public Health Risk) presents case studies assessing environmental issues and qualitative hazards for specific geographic regions, based on findings in Volumes I and II.

Figure 1 (Major Sedimentary Basins and Faults in California) shows the location of the HFO with respect to the major sedimentary basins in California. Specifically, Figure 2 (Major Formations in BLM Hollister Field Office Administrative Area) illustrates that the HFO area provides access to petroleum resources in the following sedimentary basins that occur near or within the HFO area (from north to south):

- Sacramento Basin, in Contra Costa County.
- San Joaquin Basin, in San Joaquin, Stanislaus, and Fresno Counties.
- Sargent-Hollister Basin, in Santa Clara and San Benito Counties.
- Salinas Basin, in San Benito and Monterey Counties.
- Cuyama Basin, south of the HFO area.
- Santa Maria Basin, south of the HFO area.

Recent well drilling activity is not evenly distributed across California and largely occurs outside of the HFO area. The CCST surveyed recent activity to determine the numbers of wells with first production or injection since 2002. The CCST surveys also identified the wells with records of past hydraulic fracturing. The vast majority of California statewide activity occurs in Kern County and in other portions of the San Joaquin Basin, only a small portion of which is within the eastern portion of the HFO area (CCST, 2015, Appendix J, p. 349).

Of the 12 counties in the HFO planning area, six have had some recent levels of well activity, including Alameda, Contra Costa, Fresno, Monterey, San Benito, and Santa Clara Counties. However, existing wells are located on BLM-administered land only in the following counties: Contra Costa, Fresno, Monterey, San Benito, and Santa Cruz. No wells are located on BLM-administered land in Alameda, Merced, San Francisco, San Joaquin, San Mateo, Santa Clara, or Stanislaus Counties. In general, most of the well activity in the counties covered by HFO occurs in Fresno County and in Monterey County (see Table 2, HFO Planning Area Oil and Gas Activity by County, and Table 3, Fields in HFO Planning Area with Record of Hydraulic Fracturing).

Recent oil and gas activity in the HFO area has involved only limited levels of well stimulation by hydraulic fracturing. In the Fresno County portion of the HFO area, which has the highest level of well stimulation, 4 percent of recently-producing wells indicate any record of previous hydraulic fracturing.

Table 2. HFO Planning Area Oil and Gas Activity by County (as of mid-2014)

County	Active, Producing Wells and Service Wells	Idle Wells	Buried or Plugged Wells	Wells with First Production or Injection (2002-2013)(1)	Wells with Record of Hydraulic Fracturing (2002-2013)(2)	Portion of Wells with Record of Hydraulic Fracturing (2002-2013)
Alameda	7	5	77	1	—	—
Contra Costa	55	10	598	13	1	7.7%
Fresno	3,163	1,407	5,552	1,214	42	3.5%
Merced	—	—	8	—	—	—
Monterey	1,005	663	1,893	679	3	<1%
San Benito*	27	23	336	2	—	—
San Joaquin	—	1	18	—	—	—
San Mateo	16	24	155	—	—	—
Santa Clara	19	1	89	7	—	—
Santa Cruz	—	—	59	—	—	—
Stanislaus	—	—	24	—	—	—
Total	**4,292**	**2,134**	**8,809**	**1,916**	**46**	**2.5%**

Source: DOGGR GIS (2014) appended by Appendix M, CCST, 2015; (1): Appendix L, CCST, 2015; (2): Appendix L; one of the wells with a record of hydraulic fracturing in Monterey County was a wildcat well that has been subsequently abandoned (CCST, 2015).

* In November 2014, San Benito County passed a ban on hydraulic fracturing and related gas and oil extraction activities, as well as other "high-intensity petroleum operations" including acid well stimulation and cyclic steam injection within the County. A lawsuit against San Benito County to overturn the ban was filed with the County's Superior Court by Citadel Exploration on February 27, 2015, but was dropped April 3, 2015.

Table 3. Fields in HFO Planning Area with Record of Hydraulic Fracturing (as of mid-2014)

Field	County	Active, Producing Wells and Service Wells	Wells with First Production or Injection (2002-2013)(1)	Wells with Record of Hydraulic Fracturing (2002-2013)(2)	Portion of Wells with Record of Hydraulic Fracturing (2002-2013)
Dutch Slough Gas	Contra Costa	18	7	1	14.3%
Coalinga	Fresno	2,934	1,081	41	3.8%
Lynch Canyon	Monterey	38	31	none found	none found
Monroe Swell	Monterey	14	5	2	40%
San Ardo	Monterey	918	571	none found	none found

Source: DOGGR GIS (2014) appended by Appendix M, CCST, 2015; (1): Appendix L, CCST, 2015; (2): Appendix L based on searching all records in Contra Costa and Fresno and 55% of records in Lynch Canyon, 80% of records in Monroe Swell, and 20% of records in San Ardo. Note that only 2 records of hydraulic fracturing were found in Monterey County, in Monroe Swell after searching 21.5% of well records county-wide (Appendix J, CCST, 2015).

In the HFO area, past and present oil and gas activity occurs across 35 active oil and gas fields, with a total administrative area of 195,300 acres. Twelve of the 35 active fields intersect federal mineral estate. The most-productive fields in the area (in order of cumulative past production) are:

- Coalinga Oil and Gas Field with Coalinga East Extension Oil and Gas Field;
- San Ardo Oil and Gas Field;
- Lynch Canyon Oil and Gas Field;
- Jacalitos Oil and Gas Field;
- Kettleman North Dome Oil and Gas Field; and
- Hollister-Sargent Oil and Gas Field.

Nearly all well development since 2002 occurred in the Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields. For each of these oil and gas fields and other less-productive fields, the recent activity and numbers of wells with first production or injection since 2002 are shown for these major fields in Table 4 (Well Development Activity in Major Oil and Gas Fields Within the HFO Planning Area). Other fields in the HFO area had little to no record of new activity found by the CCST ISA. Within the listed fields, the CCST survey identified over 1,700 wells with first production or injection since 2002 (CCST, 2015, Appendix L, Well-Record Result Data Set).

Table 4. Well Development Activity in Major Oil and Gas Fields Within the HFO Planning Area

Field	County	2002-2006 Wells Drilled	2007-2011 Wells Drilled	2012-2013 Wells Drilled	2002-2013 Well Total
Coalinga	Fresno	385	595	101	1,081
Coalinga East Ext	Fresno	2	0	0	2
San Ardo	Monterey	121	370	80	571
Lynch Canyon	Monterey	3	25	3	31
Jacalitos	Fresno	23	23	6	52
Major Fields in HFO, Subtotal		**534**	**1,013**	**190**	**1,737**
All Fields in HFO, Total		**551**	**1,043**	**191**	**1,785**
Annual Average Rate in HFO		**110 per year**	**209 per year**	**~110 per year**	**~150 per year**
California, Total		**14,865**	**15,520**	**6,543**	**36,928**

Source: DOGGR GIS (2014) appended by Appendix L, CCST, 2015. The 2013 year includes first nine months.

1.1 Monterey Formation

The Monterey Formation, a thick Miocene age sequence of marine sediments consisting of siliceous, phosphatic, organic, and clay-rich shales and mudstones, dolomites, and intercalated turbiditic sandstones, is a dominant traditional and potential future oil and gas resource currently being developed in California. The Monterey Formation is complex, both stratigraphically and structurally, given the active tectonic environment in which it was deposited.

In 2011, the U.S. Energy Information Administration (EIA) published a report projecting that deeper portions of the Monterey Formation "source" rock that has not yet been economically produced could contain large oil resources, estimating 15.4 billion barrels of technically recoverable oil, which, at the time, represented 64 percent of the entire estimated "tight oil" resources in the lower contiguous United States.[3] In 2012, the EIA revised its technically recoverable reserves estimate for the Monterey Formation from 15.4 to 13.7 billion barrels.

Then in December 2013, J. David Hughes, a Canadian geoscientist, published a paper stating that the EIA's 2011 production forecasts for the Monterey Formation were overly optimistic due to: (1) its geologic complexity and (2) the fact that it cannot be approached using the same types of technology that has been, and is currently applied, to other shale resources outside California, such as the Marcellus, the Bakken and the Eagle Ford shale plays[4] (DOC, 2015, p. 6-17).

Subsequently, in May 2014, the U.S. EIA announced that its 2011 projection for the estimated amount of recoverable oil from the Monterey Formation has been reduced by as much as 96 percent, meaning that the formation may only be capable of producing an estimated 600 million barrels of oil with existing technology in comparison to the initially estimated 15.4 billion barrels of oil[5] (CCST, 2014, p. 169). Neither estimate is well constrained. There is little published information on the deep sedimentary sections of the Monterey Formation, so it is difficult to estimate the potential recoverable reserves associated with these rocks. No reports of significant production of source oil from these rocks were identified in the CCST ISA, and recent exploration wells that have targeted deeper portions of the Monterey Formation, where active source rocks could potentially retain unmigrated oil, have not resulted in the identification of new oil reserves to date (CCST, 2014, pp. 122 and 169).

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[3] The U.S. EIA's 15.4 billion barrel estimate of the Monterey Formation's potential was cited in the United States District Court, Northern District of California's 2013 Order Re Cross Motions for Summary Judgment (*Center for Biological Diversity and Sierra Club v. The Bureau of Land Management,* Case No. C 11-06174 PSG), which has resulted in the preparation of this Hollister Oil and Gas RMP Amendment/EIS. However, this estimate has since been revised by the U.S. EIA and the CCST ISAs have determined that the source rock production potential of the Monterey Formation is uncertain.

[4] A "play" is a conceptual model for a style of hydrocarbon accumulation used by explorationists to develop prospects in a basin, region or trend and used by development personnel to continue to evaluate a given trend. A play (or a group of interrelated plays) generally occurs in a single petroleum system. In geology, a petroleum play, or simply a play, is a group of oil and gas fields or prospects in the same region that are controlled by the same set of geological circumstances. The geographic limit of each play represents the limits of the geologic elements that define the play. (DOC, 2015, p. 6-6)

[5] At the May 21, 2014 Oil & Gas Strategies Summit in New York, EIA Administrator Adam Sieminski announced that the federal agency had drastically cut its estimates of technically recoverable oil in the Monterey Shale from 13.7 billion barrels to 600 million barrels. According to Sieminski's reported comments, the revision was prompted, in part, by new evidence the EIA and U.S. Geological Survey collected on output from wells where new techniques have been tested.

The original area of the play was 7500 square miles, of which approximately 46 square miles was located in the HFO boundary (0.6%). The leased area inside the overall play was 1752 square miles (CCST, 2014, p. 166); 6.5 square miles were BLM leases within the 46 square miles inside the HFO boundary. There is currently a single unleased federal parcel of 56 acres (less than 0.2% of the Monterey play as currently mapped) in the HFO boundary. The remaining approximately 39 square miles of the play within the HFO boundary are non-federal minerals.

As previously mentioned, the new "area with potential" is 192 square miles (CCST, 2014, p. 166), approximately 3% of the original play size, which corresponds with the 96% reduction in unproven reserves. Unfortunately, there is no published data describing where the current "area with potential" is located. There is no record of even a single well in the HFO boundary which has targeted the Monterey Shale source rock. Federal mineral estate represents only 14% of the original play acreage within the HFO boundary (approximately 4000 federal acres out of 29,000 total acres). Consequently, based on currently available data, there is only a small chance that the current Monterey play will be successfully developed in HFO.

If the production of potential oil and gas resources in the Monterey Formation occurs in the future, it is likely that a combination of techniques would be used on vertical or horizontal wells along with increased precision due to improving modeling and reservoir characterization methods. These techniques could include acid matrix stimulation (with and without horizontal drilling), thermal recovery by steam-flooding and cyclic steam-injection, and waterflooding, in addition to some usage of hydraulic fracturing in single or multiple stages (DOC, 2015, p. 6-19).

The key to production from deeper portions of the Monterey Formation will be continued improvements in scientific and engineering understanding of the formation, both as a source rock and reservoir (DOC, 2015, p. 6-19). As such, the potential to discover significant oil resources from new plays in the deep source rocks of the Monterey Formation is highly uncertain (CCST, 2014, p. 122). Section 2.5 (Future Oil and Gas Development) discusses the oil and gas development potential of the Monterey Formation within the HFO area.

2. Oil and Gas Occurrence Potential

California

The Great Valley of California, composed of the San Joaquin and Sacramento Basins, is a forearc basin that has a thick sequence of marine and non-marine rocks which range in age from Late Jurassic to Holocene. The Great Valley is highly productive of gas in the north and of oil in the south (BLM, 2015).

The California coastal basins are located south and west of the Great Valley. They are small but typically contain very thick Neogene sedimentary rock fill. Several of these basins have been exceedingly rich in discovered petroleum, particularly the Los Angeles, Ventura, and Santa Maria Basins, which are not within the HFO area. Principal producing zones are in Miocene and Pliocene reservoir rocks, primarily sandstone units and fractured siliceous rocks (BLM, 2015).

The United States Geological Survey (USGS) has identified six Oil and Gas Provinces which partially occur within the Hollister Field Office and are shown on Figure 3 (Oil and Gas Provinces within the Hollister Field Office) (BLM, 2015):

- Province 7: North Coastal;
- Province 8: Sonoma-Livermore;
- Province 9: Sacramento Basin;
- Province 10: San Joaquin Basin;
- Province 11: Central Coastal; and
- Province 12: Santa Maria.

Provinces 9 and 10 embrace the Sacramento and San Joaquin Basins, respectively. Provinces 7, 8, 11 and 12 are within the California coastal basins.

Within these Oil and Gas Provinces, the HFO has areas of high, moderate, low and no occurrence potential (see Figure 4), which are each described in this section along with a discussion of future oil and gas development in Section 2.5 (Future Oil and Gas Development). The size of each category is shown in Table 5 (Hollister Field Office Oil and Gas Occurrence Potential).

Table 5. Hollister Field Office Oil and Gas Occurrence Potential

Category	Total Acres within HFO Planning Area	Federal Mineral Estate
High	1,853,670 acres	451,680 acres
Moderate	611,660 acres	2,680 acres
Low	2,274,610 acres	79,470 acres
None	2,080,430 acres	258,600 acres
Total	6,820,400 acres	792,430 acres

Source: BLM, 2015. CCST, 2015, p. 253.

These areas of oil and gas occurrence potential have been updated from the 2007 HFO RFDS for Oil and Gas (BLM, 2007). An explanation of the modifications from the 2007 RFDS is included in Section 2.3 (Comparison of Oil and Gas Occurrence and Development Potential with 2007 HFO RFDS). The updates are based on information from BLM geologists and from the CCST ISAs (BLM, 2015; CCST, 2014; CCST, 2015).

As summarized by CCST, Table 6 (Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin) categorizes the known petroleum volume, undeveloped conventional resource potential, and potential for unconventional continuous resources with prospective application of well stimulation treatments for basins in the HFO area (CCST, 2015, p.253).

Table 6. Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin

Basin	Known Petroleum Volume (cumulative and reserves)	Undiscovered/Undeveloped Conventional Potential	Continuous Unconventional Resource Potential
Bitterwater	Minor	Low	Low
La Honda	Minor	Moderate	Low
Pescadero	None	Low	Low
Sargent-Hollister	Minor	Low	Low
Sacramento Gas	Very Large	Moderate	Low
Salinas	Large	Moderate	Possible
San Joaquin	Very Large	Large	Possible

Known Petroleum Volume: Minor = Producing fields; Large = one giant field (>100MMBOE); Very Large = Multiple giant fields.
Undiscovered/Undeveloped Resource Potential: Low =< 50MMBOE; Moderate = 50-500MMBOE; Large => 500MMBOE.
Continuous Unconventional Resource Potential: Possible = Geology and location may permit development with existing technology and economics; Low = Not currently feasible.
Source: Table 4-6 of CCST, 2015, p. 253.

The conventional and unconventional resource information developed by CCST and summarized in Table 6 has been used to focus the areas of oil and gas occurrence potential shown in Figure 4 and discussed in Sections 2.1 through 2.3, as follows:

- The CCST information confirms that only the San Joaquin and Salinas Basins provide "possible" levels of unconventional resource potential, and these are areas of "moderate" to "very large" petroleum volume and oil and gas potential in Table 6. This confirms that the future potential for these two basins would be high.
- The high resource potential in the La Honda and Sacramento Gas basins is only partially confirmed by the CCST information that shows a "moderate" conventional resource potential and "low" unconventional resource potential. This suggests that the future potential would be moderate in these two basins.
- The high resource potential in the Bitterwater, Pescadero, and Sargent-Hollister Plays is not confirmed by the CCST information that shows "minor" known petroleum volumes and a "low" conventional and unconventional resource potential. This suggests that the future potential would be low in these three plays.
- Areas falling outside of an identified petroleum play documented in the CCST ISAs should be viewed as having a low future occurrence potential.

2.1 High Oil and Gas Occurrence Potential

Areas of high oil and gas occurrence potential are depicted on Figure 4 (Reasonable Foreseeable Oil and Gas Occurrence Potential) within the HFO area. The areas of high oil and gas potential within each USGS Oil and Gas Province are described below.

High oil and gas occurrence potential[6] is defined in BLM Planning for Fluid Mineral Resources Handbook H-1624-1 as an area having inclusion in an oil and gas play as defined by the USGS national assessment, or, in the absence of a play designation by USGS, the demonstrated existence of: source rock(s), thermal maturation, and reservoir strata possessing permeability and/or porosity, and traps. Demonstrated existence is defined by physical evidence or documentation in the literature (BLM, 1990).

Although much of the area in the HFO boundary is classified as high potential for occurrence, this does not imply that these areas have been or ever will be developed. In fact, throughout the state (and country), much — or even most — of the area classified as high potential for occurrence will likely never see development. However, it is quite likely that the vast majority of future development will be in areas classified as high potential for occurrence. This is primarily because an area classified as low or no potential has no geologic evidence of one or more of the four geologic factors required to be classified as high potential, and all four factors must be present to have the possibility of an economic accumulation.

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6 Potential refers to potential for the presence (occurrence) of a concentration of one or more energy and/or mineral resources. It does not refer to, or imply, the potential for development and/or extraction of the mineral resource(s). It does not imply that the potential concentration is or may be economic, that is, that it could be extracted profitably at the present time. (BLM, 1985).

Great Valley Oil and Gas Basins

Province 10 (San Joaquin Basin). As illustrated in Figure 4, the Province 10 area of high oil and gas occurrence potential is located in southeastern San Benito County and western Fresno County. This area is part of the San Joaquin Basin and has 8 oil fields that produce from Miocene and Pliocene marine sedimentary rocks. The Coalinga Field, located in western Fresno County, is the most productive field in the HFO area and is currently the eighth largest oil and gas field in California. The entire San Joaquin Basin in the HFO area is underlain by the following oil and gas plays, except for a 9- by 4-mile strip in the far northwest corner of the basin, just west of Westley (BLM, 2015):

- *Eocene Composite.* The area underlies all of the HFO that is within the San Joaquin Basin, except for a 9- by 4-mile strip in the far northwest corner of the basin, just west of Westley.
- *Winters-Domengine/Assessment Unit 100101: Northern Nonassociated Gas.* The area lies in the north-central part of the San Joaquin Valley north of the City of Fresno. Within the HFO this represents a strip that extends no more than 4 miles west of the eastern HFO boundary.
- *Miocene.* The area is situated in the northernmost Kettleman Hills and a portion of Kettleman Plain. It encompasses about 43,500 acres within the HFO.
- *Mature Source Rock.* The area underlain by this play is situated in Kettleman Plain. Within HFO it is about 2,400 acres.

As shown in Table 6 (Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin), the CCST ISA confirms that the San Joaquin Basin provides "large" conventional oil and gas potential, "possible" levels of unconventional resource potential, and has a "very large" known petroleum volume (CCST, 2015, p. 253).

Coastal Oil and Gas Basins

Province 11 (Central Coastal). This area of high oil and gas occurrence potential in Province 11 is located in southwestern San Benito County and southeastern Monterey County. Within the HFO, the Central Coastal Province includes two confirmed plays, the Salinas and the La Honda Oil Plays, as well as two hypothetical plays, the Pescadero and the Bitterwater Oil Plays. These basins and plays are all within the Central Coastal Neogene Play. The Central Coastal Neogene play is characterized by hydrocarbon accumulations in structural, stratigraphic, and combination traps in sandstone reservoirs mainly of Miocene age.

However, as shown in Table 6 (Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin), the CCST ISA confirms that only the Salinas Basin Play within Province 11 provides "moderate" conventional oil and gas potential, "possible" levels of unconventional resource potential, and has a "large" known petroleum volume, which corresponds to high occurrence potential in this RFDS (CCST, 2015, p. 253). The other three plays within Province 11 are discussed under Moderate and Low to No Oil and Gas Occurrence Potential below.

- *Salinas Basin.* The play includes known and hypothetical accumulations of hydrocarbons (mainly oil and associated gas) in gently to moderately deformed Tertiary rocks more than 19,000 feet thick. The Salinas Oil Play includes one giant oil field, San Ardo (about 530-860 million barrels of oil [MMBO]); the much smaller King City field (about 2.1-3.3 MMBO); and five other fields (smaller than 1 MMBO). Average producing reservoir depths are generally 2,500 feet or less.

2.2 Moderate Oil and Gas Occurrence Potential

As defined in BLM Planning for Fluid Mineral Resources Handbook H-1624-1, moderate or medium oil and gas occurrence potential areas are where there are geophysical or geological indications that the following may be present: source rock, thermal maturation, and reservoir strata possessing permeability and/or porosity and traps. Geologic indication is defined by geological inference based on indirect evidence (BLM, 1990).

Great Valley Oil and Gas Basins

Province 9 (Sacramento Basin). There are two total petroleum systems (plays) in the HFO area within the Sacramento Basin, which are separated by a regional shale layer. The *Dobbins-Forbs Play* lies below the shale and the *Winters-Domengine Play* is above. Nearly two-thirds of the estimated undiscovered natural gas resources is expected in the Winters-Domengine play. However, this area has been classified as moderate based on the CCST ISA (see also Table 6, Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin), which shows a "moderate" conventional resource potential and "low" unconventional resource potential for the Sacramento Basin (CCST, 2015, p. 253).

Within the HFO area of moderate oil and gas potential in Province 9, there are 12 productive oil and gas fields and three abandoned fields.

Coastal Oil and Gas Basins

Province 11 (Central Coastal). Within the northwestern area of the HFO, the Central Coastal Province includes the *La Honda Oil Play*. Four oil fields have been developed within this play. In 1983, there were estimated reserves of 1.7 million barrel of oil equivalent (MMBOE).

Although there is an identified play, this area has been classified as moderate based on the CCST ISA (see also Table 6, Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin), which has classified the play as having a "moderate" conventional resource potential, a "low" unconventional resource potential, and a "minor" known petroleum volume (CCST, 2015, p. 253).

2.3 Low or No Oil and Gas Occurrence Potential

BLM Planning for Fluid Mineral Resources Handbook H-1624-1 defines low oil and gas occurrence potential as areas with specific indications that one or more of the following may not be present: source rock, thermal maturation, or reservoir strata possessing permeability and/or porosity, and traps. Areas of no oil and gas occurrence potential have a demonstrated absence of (1) source rock, (2) thermal maturation, or (3) reservoir rock that precludes the occurrence of oil and/or gas. Demonstrated absence is defined by physical evidence or documentation in the literature (BLM, 1990).

Therefore, in order to assess oil and gas potential you must be in possession of information pertaining to source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, and traps. Since the USGS has assessed oil and gas plays within the HFO, it stands to reason that every place it did not identify as a play must be lacking one or more of these characteristics. Therefore, areas with potentially favorable rock type, but lacking other critical criterial have been mapped as having low potential.

Within the HFO area, the areas of low or no oil and gas occurrence potential are areas that are underlain dominantly by granitic, volcanic, metamorphic, and ophiolite sequence rocks, as well as rocks of the Franciscan Formation. These areas of low or no oil and gas occurrence potential are shown on Figure 4 and are described below for each USGS Oil and Gas Province. Province 9 (Sacramento Basin) does not have any areas of low or no oil and gas occurrence potential.

Coastal Oil and Gas Basins

Province 7 (North Coastal)

Province 7 is bounded on the west by the San Andreas Fault and within the HFO area on the east by the Hayward, Tesla and Ortigalita faults.

- *Sargent-Hollister Oil & Gas Basin* (play) is located in the southern Santa Clara Valley, about 80 miles southeast of the City and County of San Francisco. This play encompasses the Sargent and Hollister oil and gas fields. The CCST ISA (see also Table 6) shows "minor" known petroleum volumes and a "low" conventional and unconventional resource potential. Although there are active oil and gas fields with active wells within the Sargent-Hollister Play, the levels of production in these fields are minor and the CCST data suggests that the future potential would be low (CCST, 2015, p. 253).
- *South of Sargent-Hollister Play* – Low.
- *Santa Clara Valley Play (hypothetical).* Preliminary calculations suggest that about 1 billion barrels of oil may have been generated from petroleum-source rocks within the Monterey Formation in the deepest part of the subsurface sedimentary basin between Los Gatos and Cupertino (BLM, 2015). However, this hypothetical play falls outside of an identified petroleum play documented in the CCST ISAs, and thus, has been viewed as having a low future potential (CCST, 2015, p. 253).
- *San Francisco Bay/Santa Clara Valley* – Low.
- *Diablo Range/Pinnacles* – No Potential. Mostly Franciscan Formation and volcanic rocks.

Province 8 (Sonoma-Livermore)

- *Orinda Basin* is located within the Livermore Structural Play and lies immediately to the north of the Livermore Basin (BLM, 2015). The Pinol Point Field, which was discovered in 1969, was abandoned after producing 14,000 barrels of oil (BO) from the upper Miocene Neroly Formation and the Pliocene Orinda Formation. This basin falls outside of an identified petroleum play documented in the CCST ISAs, and thus, has been classified as having low future potential (CCST, 2015, p. 253).
- *Livermore Basin*, which is within the Livermore Structural Play, is bounded on the west by the Sunol-Calaveras fault and on the north, east, and south by non-prospective pre-Tertiary rocks. This basin contains more than 20,000 feet of folded and faulted Neogene sedimentary fill, and may have formed as the result of wrench faulting on strike-slip faults. Although there are two active oil and gas fields within this basin, the levels of production in these fields are minor and the basin falls outside of an identified petroleum play documented in the CCST ISA (CCST, 2015, p. 253). Therefore, the Livermore Basin has been classified as having low future potential.
- *Other areas outside of Livermore Structural Play* – Low.
- *Diablo Range* – No Potential. Mostly Franciscan Formation and volcanic rocks.

Province 10 (San Joaquin Basin)

- *Clear Creek* – No Potential. Although nearly the entire area in the San Joaquin Basin has been assessed as being within an oil and gas play by the USGS, extensive outcrops of Franciscan assemblage also occur. This area is underlain by ultramafic rock.

Province 11 (Central Coastal)

- *Pescadero Oil (hypothetical).* The area of this play appears to be the onshore, northeastern margin of a major offshore sedimentary basin, the Año Nuevo Basin (also known as the Outer Santa Cruz Basin). The CCST ISA (see also Table 6) shows "none" known petroleum volume and a "low" conventional and unconventional resource potential. This suggests that the future potential would be low in this hypothetical play (CCST, 2015, p. 253).
- *Bitterwater Oil (hypothetical).* The Bitterwater Play contains only one commercial oil field, and that field is smaller than 1 MMBO. The CCST ISA (see also Table 6) shows "minor" known petroleum volumes and a "low" conventional and unconventional resource potential. This suggests that the future potential would be low in this hypothetical play (CCST, 2015, p. 253).
- *Montara Mountain* – No Potential. Granitic, metavolcanic, Franciscan Formation rocks.
- *Ben Lomond Area* – No Potential. Granitic, metamorphic, Franciscan Formation rocks.
- *Gabilan Range* – No Potential. Granitic rock.
- *Monterey Peninsula* – No Potential. Granitic rock.

Province 12 (Santa Maria)

The northern most portion of the Santa Maria Province extends into the HFO area. The Santa Maria Province is generally bounded by the Sur-Nacimiento fault (on the east), but extends beyond that fault north of latitude 36°N to include the approximate extent of exposed pre-Cretaceous metamorphic basement rocks. Within the Santa Maria Province, there are no oil and gas plays in the HFO area.

- *Northern Santa Lucia Range* – No Potential. Granitic, metamorphic, Franciscan Formation rocks.

2.4 Comparison of Oil and Gas Occurrence Potential with 2007 HFO RFDS

Based on further analysis of the geology of the area and updated information, the areas of oil and gas occurrence potential have been modified from the 2007 HFO RFDS for Oil and Gas. An explanation of the similarities and differences between the 2007 RFDS and the current RFDS is described below.

Although, there are some differences in the geometry, the Salinas Basin and Sacramento Basins are both shown as having high oil and gas occurrence potential in the 2007 and the current RFDS. Likewise, the Santa Maria Province, Gabilan Range, and Diablo Range were determined to have no oil and gas occurrence potential in this RFDS, as well as in the 2007 evaluation.

The area between Santa Cruz and Point Año Nuevo that is within the La Honda Play was classified as having moderate oil and gas occurrence potential in the 2007 RFDS and herein. Other portions of the La Honda Play were classified as having high oil and gas occurrence potential in the 2007 RFDS, but are now classified as moderate based on the CCST ISA data (see Table 6, Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin).

There are areas within the San Joaquin Basin classified as having low and moderate occurrence potential in the 2007 RFDS. However, the USGS has identified petroleum plays in nearly the entire San Joaquin Basin within the HFO, and based on the CCST ISA, almost this entire basin is now classified as having high oil and gas occurrence potential.

The 2007 RFDS classified the Bitterwater Play (hypothetical) and Sargent-Hollister Play as having high oil and gas occurrence potential, however, these areas are now considered to have low oil and gas

occurrence potential. The area to the north of Point Año Nuevo is within the Pescadero Play (hypothetical), which was classified as having moderate occurrence potential in the 2007 RFDS, but has also been revised to low occurrence potential based on the CCST information.

Furthermore, the Orinda and Livermore Basins are determined to have low oil and gas occurrence potential, but they were classified as having moderate occurrence potential in the 2007 RFDS. Likewise, within the Central Coastal Province, the area within the Neogene Play, north of the Salinas Basin, is determined to have low occurrence potential, but this area was classified as moderate in the 2007 RFDS.

Finally, the Santa Clara Valley Play (hypothetical), west of the City of San Jose, is missing from the 2007 evaluation. In the 2007 RFDS, the hills on both sides of the San Francisco Bay are shown as having no potential, however, with the identification of the Santa Clara Valley Play (hypothetical) and other gravity lows in the vicinity (San Leandro and Evergreen lows), these areas are now classified as having low oil and gas occurrence potential.

2.5 Future Oil and Gas Development

Most oil fields in California are located in reservoirs associated with structural traps at depths above the oil window. The oil window is defined as the range of depths for which a source rock, having undergone burial and heating, will generate oil. This is a function of the type of organic matter and the integrated time-temperature history of the source rock (CCST, 2014, p. 122). The location of the identified reservoirs relative to the oil window indicates that the oil in these petroleum systems has migrated from the source rocks to the reservoirs. While there have been few new onshore oil discoveries in the past two decades, the USGS estimated that almost 1.59 billion cubic meters (10 billion barrels of oil) can be recovered using existing technologies, including well stimulation methods, from the largest oil fields in the San Joaquin and Los Angeles Basins (CCST, 2014; p. 29).

Overall, there are five major sedimentary basins in California with reservoirs of known economically viable oil and gas resources (the Los Angeles, Ventura, Santa Maria, Salinas, and San Joaquin Basins), as shown on Figure 1 (Major Sedimentary Basins and Faults in California). Portions of the HFO are within the San Joaquin Basin in San Benito and Fresno Counties and portions of the HFO are within the Salinas Basin in Monterey County.

Based on the production history of these regions and the presence of shale formations in these areas, it is likely potential future oil and gas resource production will be centered in these five basins. Economic production potential lies primarily in the San Joaquin, Santa Maria, and Ventura Basins, principally in Santa Barbara and Kern Counties. Production potential also exists in San Luis Obispo, Ventura, Kings, Monterey and Los Angeles Counties.

The HFO area includes portions of the Monterey Formation in the San Joaquin Basin and Salinas Basin, along with portions of the Kreyenhagen, Tumey and Moreno Formations in the San Joaquin Basin (CCST, 2014, pp. 149 to 150); the surface areas of these formations appear on Figure 2 (Major Formations in BLM Hollister Field Office Administrative Area). Portions of San Ardo, Coalinga, Jacalitos, Kreyenhagen, and Kettleman North Dome oil and gas fields overlie source rock that is Monterey-equivalent. The plays are within Monterey, San Benito, and Fresno Counties, and the eastern edge of the HFO area in Stanislaus and Merced Counties. Figure 5 (Plays and Active Oil and Gas Wells) shows the plays and active oil and gas wells within the HFO area. The discussion of future oil and gas development within the HFO area focuses on the areas of these identified plays, which correspond to areas of high and moderate oil and gas occurrence potential shown in Figure 4 and discussed in Sections 2.1 and 2.2. Over 29,000 acres

of the HFO area, including over 4,000 acres of federal mineral estate, overlay the Monterey Formation play at the southeastern end of the HFO area.

Furthermore, there are three general categories of prospective target areas for oil production involving well stimulation in California, including within the HFO area. These targets include: (1) continued or increased oil production from discovered oil fields or similar undiscovered reservoirs; (2) organic-rich shales located deep in the basins within the oil window; and (3) oil-bearing shales in basins where little oil production has occurred. Each category is described in greater detail below.

The first target consists of continued or increased oil production from discovered oil fields (or similar undiscovered reservoirs) that produce from formations with low permeability (also known as tight oil formations). The producing oil reservoirs in these fields generally lie above the oil window, indicating that the oil has migrated upwards from deeper source rocks and is now contained by structural, stratigraphic, and/or diagenetic traps. Of these producing fields, many have oil sourced from the Miocene Monterey Formation (or Monterey Formation-equivalent rocks). A significant fraction of these fields also have oil reservoirs in the Monterey Formation, often hosted in diatomites, fractured siliceous shales, or in interbedded sandy turbidite deposits; the oil has migrated from the deeper active source rock into shallower reservoirs with overlying seals. (CCST, 2014, p. 124)

Well record search results indicate about 75 wells per month were fractured in California in the decade prior to 2012, rising to closer to 100 wells per month in 2012 to 2013 (CCST, 2015, p. 94). To date, 95 percent of the hydraulic fracturing well stimulation activity in California has been in the San Joaquin Basin, and specifically within the Monterey Formation diatomites in South Belridge, Lost Hills, and Elk Hills fields of the San Joaquin Basin in Kern County, all of which are outside of the HFO area (CCST, 2015, p. 94; and CCST, 2014, pp. 124 to 125). Most of the rest of the well stimulation activity occurs in the Los Angeles and Santa Barbara/Ventura Basins, also outside of the HFO area (CCST, 2015, p. 94).

Likewise, increased recovery in the San Joaquin Basin within the HFO area would likely require stimulation methods. There is no history of hydraulic fracturing in the wells in San Benito County within the San Joaquin Basin. In the Salinas Basin, 17 percent or approximately 20-30 wells were hydraulically fractured out of 156 wells drilled between 2002-2006 in Monterey County; however, none of the 523 wells drilled in Monterey County since that time have records of being hydraulically fractured (CCST, 2015, pp. 349 to 350), as shown in Tables 2 and 3 in Section 1.

A second target area consists of organic-rich shales located deep in the basins within the oil window. These zones have not been a major target for oil exploration in California. However, shales, such as those within the Monterey Formation, have been the source rocks for much of the oil that has been discovered and produced in California. Depending on how much oil still remains in these rocks, there may be significant potential associated with these source rocks. Exploitation of the source rock would constitute a true shale oil play. This target corresponds to the Monterey Formation oil play described by U.S. EIA and discussed in Section 1 (Monterey Formation) above. However, estimates of the potential size of recoverable oil associated with this target are highly uncertain. (CCST, 2014, p. 125)

While reservoir stimulation techniques may improve natural gas production from these low permeability reservoir rocks sporadically, widespread development of unconventional gas resources in California using well stimulation appears unlikely (CCST, 2015; p. 19). Given the level of uncertainties regarding the distribution and abundance of oil retained in deep Monterey source rocks, or how successful production could occur, significant future production of this target is not expected. Even if some of the uncertainties are resolved, these advances are not likely to alter the RFDS for federal minerals in the planning area for the next 15 to 20 years due to the geology of the region (see Section 3, RFDS Assumptions).

A third potential target would be oil-bearing shales in basins where little oil production has occurred. Very little published information is available about these basins, except for some data relating to the presence and distribution of potential source rocks. (CCST, 2014, p. 126). In the HFO area, basins having relatively little oil production include the Bitterwater, La Honda, Pescadero, Sacramento Gas, and Sargent-Hollister Basins. As shown in Table 6 (Resource Volume and Unconventional Resource Potential in the HFO Area, by Basin), these areas also have a "low" resource potential for continuous unconventional resources according to the CCST; this is in contrast with "possible" levels of unconventional resource potential in the better-established San Joaquin and Salinas Basins (CCST, 2015, p. 253).

3. RFDS Assumptions

For purposes of this document, we have assumed that all potentially productive areas are open under standard lease terms and conditions, except those areas designated as closed to leasing by law, regulation, or executive order. This section describes future trends and assumptions within the HFO area that have been incorporated into the RFDS. This RFDS is applicable to all alternative scenarios, because the alternatives considered in the RMP Amendment/EIS consider which BLM-administered lands to open or close to leasing, which would not impact the RFDS assumptions.

The history of activity for oil and gas exploration and development on federal lands within the planning area is extremely low compared to private minerals. In May 2014, the U.S. EIA announced that its 2011 projection for the estimated amount of recoverable oil from the Monterey Formation has been reduced by as much as 96 percent, meaning that the formation may only be capable of producing an estimated 600 million barrels of oil with existing technology in comparison to the originally estimated 15.4 billion barrels of oil. However, both estimates for oil resources from new plays in the deep source rocks in the Monterey Formation are highly uncertain (see Section 1.1). As discussed in Section 2.5 (Future Oil and Gas Development), given the level of uncertainties regarding the Monterey Formation source rock, significant future production of this target is not expected (CCST, 2015, pp. 15 to 19).

Therefore, this RFDS assumes leasing and exploration will continue at levels consistent with historic development. In other words, oil and gas leasing and exploration trends are not likely to increase or decrease. Rather, oil and gas activity within the HFO area over the next 15 to 20 years is likely to remain sporadic and primarily on non-federal lands. Furthermore, additions of new reserves are expected to continue the decline begun in 1990 in all management areas.

The past 10 to 15 years have seen both historic lows and historic highs in both oil prices and drilling. Between late 1998 and mid-2008, oil prices for the Midway Sunset field, which produces the largest onshore volume of federal crude in California, rose from $6 per barrel to $120 per barrel, a 20-fold increase. However, U.S. and world economic conditions have significantly deteriorated since then, and Midway Sunset crude was down to approximately $25 per barrel in late 2009. As of February 2010, the price had risen to $69 per barrel, by mid-January 2011, to $86.25, and by mid-March 2011, to nearly $110 per barrel, where it held fairly constant until mid-2014. At that time, oil prices began a rapid decline down to the $40's per barrel by early 2015, further demonstrating the volatility of crude prices. Consequently, there is no consensus among forecasters as to what the demand for oil will be in either the near term or long term. Most current forecasts are for demand to continue to drop in the near term to midterm and to remain depressed into the foreseeable future. (BLM, 2012)

Because oil and gas are worldwide commodities, events that occur globally may have significant effects on U.S. production. The political instability of other nations that have most of the world's reserves changes regularly, causing difficulty in forecasting worldwide levels of petroleum supply and demand. In addition, the U.S. and worldwide economic conditions have changed dramatically within the last couple

of years, causing further uncertainty. However, such large deviations in economic conditions surrounding the global (and domestic) supply and demand for oil are not likely to alter foreseeable development in the HFO. This assumption is based on the experience of local experts with knowledge of leasing and exploration of federal minerals over long periods of time that included fluctuations in the global (and domestic) supply and demand for oil.

Even if there are advances in science and technology that resolve some of the uncertainty associated with the Monterey Formation source rock, these advances are not likely to alter the RFDS for federal minerals in the planning area for the next 15 to 20 years due to the geology of the region. Therefore, all available scientific, industry, and government information indicates that absent currently unforeseen changes in oilfield technology, future oil and gas development within the HFO area will continue as it has over the last 10 or 20 years.

4. Estimated Number of Wells

As noted above, in the last decade, nearly all well development occurred in the Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields (see Table 4, Well Development Activity in Major Oil and Gas Fields Within the HFO Area) where the federal share of mineral estate is approximately 1 percent. Recent activity indicates that an annual average rate of between 110 and 210 wells per year (approximately) have had first production or injection since 2002 in the region (basis of Table 4). Assuming that the development trend in this region is likely to continue for the next 15 to 20 years, up to 3,150 wells could be initiated over 15 years with over 99 percent of these wells located within the Coalinga, San Ardo, Lynch Canyon, and Jacalitos fields. Furthermore, assuming that the federal share of development is likely to remain roughly proportional to the federal share of mineral estate in these four most-active fields (1 percent), between zero and 32 development wells could be expected over 15 years on federal mineral estate within existing fields in the HFO area.

Exploratory wells are not common in the HFO area. Fewer than 1 percent of the wells counted in the HFO area occur outside of existing administrative oil and gas field boundaries. Based on the history of oil and gas exploration in the planning area, very few exploratory wildcat wells (wells outside of the administrative boundary of existing oil and gas fields) would be drilled on federal mineral estate in the planning area during the life of this plan. The past trend indicating only 1 percent of wells are outside administrative field boundaries implies that roughly 32 exploratory wells would be drilled on lands within the HFO planning area. Given that 11.6 percent of land in the planning area is federal mineral estate, 3 to 5 exploratory wildcat wells would be drilled on federal mineral estate in the HFO area during the life of this plan and includes possible Monterey Formation exploration.

Although the success rate for wildcat wells has improved markedly during the past decade, largely due to improved seismic data from geophysical exploration, it is still unlikely that any new fields would be discovered by drilling on federal minerals, because there is so little activity in areas with a significant amount of federal mineral estate. During the past 30 years, only one new field was discovered within the HFO boundary (the Bixler Gas field, a very small 1.5 square mile gas field that was discovered in Contra Costa County in 1993). (DOGGR Annual reports, 1985 through 2014, searching for fields with first production after 1985). This four well field produced a total of 5.6 BCF by the time it was abandoned in 2001 (DOGGR 2001 Annual Report). The rarity of new discoveries (one very small field that was discovered more than 20 years ago, which contained no federal land), combined with the fact that less than 25% of the high occurrence potential land in the HFO boundary is federal mineral estate, results in a reasonable conclusion that: (1) It is far from certain that any new fields will be discovered,

and (2) If a new field is discovered, it would contain less than 25% federal land, depending, of course, on where the field is discovered.

Given the limited extent of area of federal mineral estate within the entire planning area, it is unlikely that more than a total of 37 exploratory and development wells will be drilled on federal oil and gas leases. Well stimulation technologies and enhanced oil recovery techniques are assumed to be used on any or all of these wells.

While the large majority or even all of this activity is expected to occur in areas identified in this RFDS as "high oil and gas occurrence potential," there is always a possibility that federal minerals in other areas may see geophysical exploration, leasing, and even actual exploration and development drilling. It is highly unlikely that any wells in such an area would be productive, so any associated surface disturbance would likely be short term. As discussed in Section 3 (RFDS Assumptions), given the level of uncertainties regarding the Monterey Formation source rock, significant future production of this target is not expected.

The basic assumptions of the number of wells in this RFDS are summarized in Table 7 (HFO Oil and Gas Well Development Scenario Assumptions) and discussed in greater detail below.

Table 7. HFO Oil and Gas Well Development Scenario Assumptions

	Wells/Fields on Federal Mineral Estate	Basis of Assumption
New/Additional Fields Discovered	0	Exploration is not expected to lead to new producing field discoveries in HFO area.
New/Additional Wells (exploratory)	3 to 5 wells	Roughly 1 percent of 3,150 wells drilled across entire HFO planning area during life of plan are exploratory and 11.6 percent of these of these may occur on federal mineral estate.
New/Additional Wells within Existing Fields (development)	0 to 32 wells	Roughly 1 percent of 3,150 new production/injection wells in HFO area over 15 to 20 years are on federal mineral estate.

5. Estimated Surface Disturbance

This section provides a description of potential oil and gas activities and associated ground disturbance estimates for geophysical exploration, drilling, and field development and production.

Ground disturbance assumptions associated with well drilling and development would remain largely the same as those in the HFO RFDS for Oil and Gas, which was included as Appendix F in the Record of Decision for the RMP for the Southern Diablo Mountain Range and Central Coast of California (BLM, 2007). The ground disturbance assumptions are described herein for the reader, and the total disturbance estimates have been updated to reflect the revised future trends and assumptions of oil and gas development stated below. In addition, assumptions associated with well stimulation technologies and enhanced oil recovery techniques have been explicitly stated in Section 6 (Other RFDS Activities or Considerations) and incorporated into the RFDS.

Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions) summarizes the potential surface disturbance assumptions associated with the development scenario of zero to 32 new development wells, 3 to 5 exploratory wells, and geophysical exploration. The total surface disturbance caused by seismic operations, exploration drilling, and development would be up to 206 acres. Each component is described in greater detail in Sections 5.1 through 5.3.

Table 8. Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions

Description	Number	Unit Surface Disturbance	Total Surface Disturbance
Exploratory Wells			
Well pads	3 to 5 wells	1 to 3 acres/well	3 to 15 acres
Roads (40' wide)	3 to 5 x 0.5 miles	4.8 acres/mile	7.2 to 12 acres
Development Wells			
Well Pads	0 to 32 wells	1 to 3 acres/well	0 to 96 acres
Roads (40' wide)	0 to 32 x 0.25 miles	4.8 acres/mile	0 to 38.4 acres
Facilities	0 to 8 facilities	1 acre/facility	0 to 8 acres
Seismic (2 tracks x 18")	34 miles	0.36 acre/mile	12.25 acres
Pipeline (20' wide)	0 to 10 miles	2.4 acres/mile	0 to 24 acres
Total			**22.45 to 205.7 acres**

5.1 Geophysical Exploration

Geophysical exploration is conducted to determine the subsurface structure of an area and the potential for mineral resources. There are three geophysical survey techniques that are generally used to define subsurface characteristics through measurements of the gravitational field, magnetic field, and seismic reflections.

Gravitational Field Surveys and Magnetic Field Surveys involve small, portable measuring units that are easily transported by light off-highway vehicles, such as 4-wheel drive pickup trucks and jeeps, or aircraft. Both off and on-highway travel may be necessary. Although these two survey methods can take measurements along defined lines, it is more common to have a grid of distinct measurement stations. Surface disturbance resulting from these surveys is negligible, consisting almost exclusively of soil or vegetation compaction that persists no more than a few months.

Seismic Reflection Surveys are the most common of the geophysical exploration methods, and they produce the most detailed subsurface information. Seismic surveys are conducted by sending shock waves, generated by a small explosion or by mechanically beating the ground with a thumping or vibrating platform.

In the *explosive method*, small charges are detonated on the surface or in a shallow drill hole. The surface charge method uses 1- to 5-pound charges attached to wooden laths 3 to 8 feet above the ground. Placing charges lower than 6 feet usually results in destruction of vegetation, whereas placing the charges higher, or on the surface of deep snow, results in little visible surface disturbance. In the drill hole method, holes for the charges are drilled using truck-mounted or portable air drills. In general, this method uses 4 to 12 holes per mile of line, and a 5- to 50-pound explosive charge is placed in each hole, covered, and detonated. The shock wave created is recorded by geophones placed in a line on the surface. In rugged terrain, a portable drill carried by helicopter can sometimes be used. The vehicles used for a drilling program may include heavy truck-mounted drill rigs, track-mounted drill rigs, water trucks, a computer recording truck, and a light pickup.

In the *mechanical method*, four large trucks are usually used, each equipped with pads about 4-feet square. The pads are lowered to the ground, and the vibrations are electronically triggered from the recording truck. Once information is recorded, the trucks move forward a short distance and the process is repeated. Surface disturbance includes flattening of vegetation and compaction of soils.

In either type of seismic reflection surveys, existing roads and trails are used where possible. However, off-road travel is necessary in some cases. Several trips per day are made along a seismograph line, usually resulting in a well-defined two-track trail.

Two geophysical exploration projects have occurred on federal mineral estate within the HFO area in the last 10 years. One geophysical seismic survey project is located in the Vallecitos Oil and Gas Field and encompasses 32,288 acres, including approximately 70 percent private lands and 30 percent under the jurisdiction of the BLM. The other 3-D geophysical survey project is located in the Kettleman Hills North Dome Oil and Gas Field and encompasses 129,995 acres, including approximately 9,349 acres of surface estate under the jurisdiction of the HFO in Fresno County and the Bakersfield Field Office in Kings County. In addition to the projects on BLM-administered land, there have been only two other geophysical exploration projects on private land in the HFO area since the 2007 RMP.

Therefore, it is expected that no more than 4 Notices of Intent, involving seismic reflection and gravity/ magnetic field surveys across federal surface, would be filed under all alternatives during the life of this plan. If that occurs, the total expected surface disturbance could be up to 12.25 acres, based on up to 34 miles of seismic lines and a two-track road with each track being 18 inches wide.

It is possible that much of the travel could be located on existing roads or other previously disturbed lands, and there could be some hand laying of lines, and that would result in less new disturbance. On the other hand, it is possible that actual disturbance could be greater if more vibroseis (a seismic exploration technique) or other vehicular traffic is done on slopes or wet ground and there is more "churning" of the soil by the trucks or more crushing of plants by the vibratory pads. There could also be increased disturbance if the seismic trucks have to go in areas where there are no existing roads or trails.

Regardless of what is proposed, the operator will be required to conduct operations in a manner that minimizes unnecessary disturbance and prevents undue and unnecessary degradation to the natural resources. This would include requiring the operator to stay on existing roads and trails when possible, and requiring the operator to either hand carry or use heliportable equipment in areas of special sensitivity.

5.2 Drilling Phase

After a parcel is leased, there may or may not be any actual disturbance. In fact, historically, a large majority of leases are relinquished without ever having any actual surface disturbance. In the event that an APD is submitted, a site specific evaluation will be made by the BLM to ensure compliance with NEPA requirements. Based on the results of that evaluation, additional Conditions of Approval may be added, and the operator may only begin construction after complying with lease stipulations and Conditions of Approval of the drilling permit. When a site requires construction of an access road, the shortest feasible route is usually selected to reduce the haul distance and construction costs. Environmental factors or a landowner's wishes may dictate a longer route in some cases. Drilling in the planning area is expected to be done using existing roads and construction of only short (approximately 0.5 mile long) roads to access drill site locations.

Most drilling is expected to occur in areas of land designated as "high oil and gas occurrence potential" (shown on Figure 4), which generally corresponds to identified oil and gas plays within the San Joaquin and Salinas Basins discussed in Section 2 (see also Figure 5). Most wells drilled would be vertical; however, a small percentage of recently installed wells in California have been horizontal. All but 3 of these wells, more than 99 percent of the total, were installed in pre-existing fields as defined by DOGGR. The

3 horizontal wells outside pre-existing fields were in Kern County, as are 92 percent of all horizontal wells drilled with a commencement date in 2012 or 2013. Outside of Kern County, 11 horizontal wells were installed in Fresno County, all in the Coalinga field; and 9 were installed in Monterey County, all in the San Ardo field. Finally, 3 fields in Ventura County and 2 fields in Los Angeles County each had 1 or 2 horizontal wells installed (CCST, 2015, p. 345 to 346).

During the first phase of drilling, the operator would move construction equipment over existing maintained roads to the point where the access road begins. Less than 0.5 mile of moderate duty access road per well with a gravel surface 20 feet wide is expected for construction. With ditches, cuts, and fill, the total width of surface disturbance would average 40 feet. The second part of the drilling phase is the construction of a drill pad 1 to 3 acres in size. The likely duration of well drilling, testing, and abandonment (if the well is unsuccessful) is 3 or 4 months per site. If the well is successful, the useful life could be several decades or even more. The total disturbance for each exploratory well and any new road is estimated to be 5.4 acres. The total surface disturbance caused by exploratory drilling of 3 to 5 wells over the life of this plan is expected to be no more than 10 to 27 acres.

5.3 Field Development and Production

Given past and current oil and gas development trends, uncertainty with development of the Monterey Formation source rock, and predicted future oil and gas development in the HFO area, exploratory drilling is not expected to lead to the development of a producing field in the planning area within the 15 to 20 year projections included in this RFDS and the RMP Amendment/EIS. Furthermore, even if a new field were developed, given the share of federal mineral estate within the HFO area, the location of the areas of high and moderate oil and gas occurrence potential, and past and current trends of oil and gas development on private land, this field would not likely be located on federal mineral estate. Nonetheless, the following scenario describes the operations and effects associated with field development of the 32 new development wells.

The minimum size considered economically feasible would depend mainly on its proximity to existing infrastructure. There are many fields within the boundaries of the HFO area, mostly in the extreme southern and extreme northern portions of the planning area, and it is likely that any pipelines from a new field would be relatively short. In gas fields, wells within the actual productive boundaries, which are smaller than the administrative boundaries, are spaced on average at 80 to 160 acres. In larger oil fields, well density can be much higher, typically at 5 to 7 acres per well or up to an equivalent density of 128 wells per square mile. However, spacing can be as close as one or more wells per acre in areas with heavy oil.

Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions) summarizes the potential surface disturbance assumptions associated with the development scenario of up to 32 new development wells in a new field. Each development well would require an estimated 0.25 mile of road, which would have a surface of crushed aggregate or gravel approximately 20 feet wide (total disturbed width of 40 feet). Well pads would be no more than 1 to 3 acres in size. Oil and gas produced would be carried by pipelines that could be linked to existing and proposed transmission lines in the planning area. Average infield pipeline length is estimated to be 0.25 mile per well, which could probably be largely contained within the road right-of-way and little new surface disturbance would be required. The total distance from a new field to an existing transmission pipeline is likely to be less than 10 miles. The width of the surface disturbance for pipelines would average 20 feet.

The maximum total surface disturbance for 32 development wells is shown in Table 8 and would be 96 acres for well pads, 38.4 acres for roads, and 24 acres for 10 miles of transmission pipeline. No more

than 1 acre would be required for the small facility (meter, separator) on each parcel. For planning purposes, it is assumed that the wells may be on 8 separate parcels, so there would be a total of 8 acres for facilities. The total surface disturbance caused by development wells would be up to approximately 166 acres, as shown in Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions).

6. Other RFDS Activities or Considerations

This section provides a description of potential oil and gas activities for well stimulation, enhanced oil recovery, wells operations and maintenance, plugging and abandonment, and oil and gas activity on military bases.

The RFDS also considers wells required for groundwater monitoring in areas of oil and gas well stimulation and underground injection control wells. As required by the State Water Resources Control Board Draft Model Criteria for Groundwater Monitoring in Areas of Oil and Gas Well Stimulation, the RFDS assumes a minimum of one upgradient and two downgradient monitoring wells for each protected aquifer that is penetrated by the stimulated well. This does not change the number of assumed wells in the RFDS as the monitoring wells may use already existing wells or multiple oil and gas wells may use the same monitoring wells. The types of activities required to drill a new monitoring well are similar to those described in Section 5, Estimated Surface Disturbance. Underground injection control wells are discussed below in the stimulation technologies.

6.1 Well Stimulation Technologies

Depending on the type of formation and the current state of the wellbore, well stimulation, such as hydraulic fracturing, acid matrix stimulation or acid fracturing, may be required on any or all of the wells. Only one of these treatments for the purposes of well stimulation would be used on any given well. Well stimulation treatment operations would occur entirely within the well pad and no additional ground disturbance would be anticipated beyond what is described in Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions).

Of the 32 development wells and 3 to 5 exploratory wells that are anticipated to be drilled within the HFO area, it is assumed that well stimulation technologies could be used on any or all of these wells. Well stimulation is anticipated to be performed primarily on wells located in high potential occurrence zones. Hydraulic fracturing, acid matrix stimulation, and acid fracturing are described in greater detail below.

Enhanced oil recovery (EOR) techniques, which are used to increase production over the life of a well, may be used in conjunction with well stimulation technologies. The CCST ISAs focus on well stimulation technologies for reservoirs that are unconventional because of low permeability. Therefore, EOR methods for reservoirs that contain viscous oils are not addressed in detail in the reports. EOR within the HFO area under this RFDS is discussed in a separate section (Enhanced Oil Recovery) below.

Hydraulic Fracturing

Hydraulic fracturing is not part of the drilling process. It is a well completion technique to stimulate the well and maximize the extraction of underground resources from the target zone. Hydraulic fracturing is applied after the well is drilled, several strings of protective steel casing are cemented in place, and the wellbore has been perforated. The process of hydraulic fracturing injects highly pressurized fluids and

sand (called "proppant") into a geologic formation, which creates and props open fissures, or pathways, through which the produced fluids can more easily flow into the wellbore.

Hydraulic fracturing has been used as a production stimulation method in California since the late 1960s. However, fewer than 25 percent of all wells drilled within the State are hydraulically fractured, and the vast majority of past and currently recorded fracturing activities occurs in the southwestern portion of the San Joaquin Valley, in Kern County, outside of the HFO area (DOC, 2015, p. 7-25; CCST, 2014, p. 25).

There are several steps during the hydraulic fracturing process that together make up one "stage." Hydraulic fracturing treatments are delivered, one section or "stage" at a time, starting at the deepest extent in a vertical well, or at the farthest end of a horizontal well, and then working back towards the top of the producing zone, or where a directional well curves from horizontal to vertical and the entire horizontal length of the well has been fractured. Although overall a horizontal well can be much longer than a vertical well, the hydraulic fracture treatment targets an individual zone; as such, the amount of water, sand, and additives used are the same, *stage for stage* within this individual zone. (DOC, 2015, p. 7-29). The overall length of the well to be stimulated determines the number of stages and the overall amount of water, proppant, and chemical additives required.

The majority of the oil produced from fields in California is not from within the source rock (e.g., shale in the Monterey Formation), but rather from geologically limited reservoirs containing oil that has migrated from source rocks. These reservoirs do not resemble the extensive and continuous layers that are amenable to oil production with high water-volume hydraulic fracturing from long-reach horizontal wells, such as found in the Bakken in North Dakota and Eagle Ford in Texas (CCST, 2015 p. 153).

In California, a typical hydraulic fracturing "job" occurs in a shallow vertical well and contains only 1 to 5 stages. However, there could be up to 20 stages in a deep horizontal well during exploration of the Monterey Formation source rock. Each stage may include the injection of an acid preflush (not generally used in California); fluid without proppant (called "pad"); fluid that contains proppant; and then water to flush excess proppant back up the well. For a typical job, the total on location time is approximately 16 hours with 8 to 15 employees on each shift (DOC, 2015, p. 7-33). This time does not include site preparation by the operator (including water transport and storage at the site) or flow back of the fluids from the hydraulic fracturing treatment and from the reservoir formation to the surface.

Water and proppant make up approximately 99.5 percent of the fluid used in hydraulic fracturing. Of that, in California, 75 percent is typically water and 25 percent is typically sand (DOC, 2015, p. 7-36). Although there is considerable variation, average water use for hydraulic fracturing in California has been approximately 130,000 to 210,000 gallons per operation based on voluntary disclosures by operators in the FracFocus database (CCST, 2014, p. 26)[7]. In addition, 200 to 500 tons of proppant are typically used for a hydraulic fracturing treatment in California (DOC, 2015, p. 7-37).

Chemical additives used in well stimulation fluid consist of a blend of common chemicals that increase water viscosity, help extend the fracture, and suspend/transport the proppant and water mixture farther out into the fractures (tens to hundreds of feet). Additives also control bacterial growth, minimize swell-

[7] Water usage for hydraulic fracturing in California is considerably less than in other hydraulically fractured plays in the United States. For instance, average water use per operation in a horizontal well in the Eagle Ford in Texas is 4.25 million gallons. The difference results in part from the predominance of hydraulic fracturing in relatively shallow vertical wells in California, which have shorter treatment intervals, as compared to the predominance of horizontal wells in major unconventional oil plays like the Eagle Ford and Bakken, as well as the use of gel as opposed to slickwater in those other plays. (CCST, 2015, pp. 150 to 151)

ing of clay particles in the formation, and inhibit corrosion to help maintain the integrity of the well. Additives include gels, foams, and other compounds. These other liquid and solid additives that may be incorporated in the fracturing fluid consist of the following: surfactants, a soap-like product designed to enhance water recovery; friction reducers; biocides to prevent microorganism growth; oxygen scavengers and other stabilizers to prevent corrosion of metal pipes; and acids to remove drilling mud damage. Some of the additives are recovered in the water that flows back after the hydraulic fracture treatment (15 to 80 percent, depending on the specific treatment job), and most of the remainder is recovered once the oil or gas well is brought into production. The hydraulic fracturing product additives that may be used for fracturing the Monterey Formation source rock in the future would likely contain chemical constituents similar to the types of products that have been used to date for the hydraulic fracturing of traditional oil and gas reservoirs in California, including the Monterey Formation. (DOC, 2015, p. 7-38)

Equipment required for a typical hydraulic fracturing operation would include the following:

- Control Vans
- Pump Trucks
- Flatbed
- Manifold/Treating Iron Trailer
- Tanker/Mixer (5,000 gallon)
- Blender
- Crane
- Sand Chiefs (150-ton capacity)
- Pickup Trucks or Vans
- Water Tanks (500 barrel laydown tanks or 400 barrel upright tanks)
- Water Trucks (4,000 or 5,000 gallon) (if not available via pipeline)
- Sand Trucks (25-ton capacity)

Aside from water and proppant delivery, each vehicle is assumed to have one round trip to the site. However, for a multi-day operation, pickup trucks, vans, or personal vehicles typically deliver the crew to the site each day. (DOC, 2015, p. 7-43)

At the conclusion of all hydraulic fracturing stages, "flowback" fluids are brought up through the wellbore to the surface by the well operator. The composition and amount of flowback recovered depends on the characteristics of the targeted formation and the specific fluid used for the hydraulic fracturing job. Remaining fracturing fluid that does not flow back immediately is recovered from the well along with oil, gas and produced water slowly over time. Flowback fluids are either temporarily stored in tanks onsite, or flowed directly into a production pipeline where hydrocarbons and produced water are subsequently separated at a processing facility (DOC, 2015, p. 7-36). Recently finalized regulations (published March 26, 2015) require all flowback to be contained in storage tanks onsite prior to final disposition. Flowback and produced water, collectively known as wastewater, is typically handled in the following ways: (1) injected (with or without treatment) into water disposal/enhanced recovery wells; or (2) recycled (with or without treatment) for use in future oil and gas operations, including hydraulic fracturing or injection into the target hydrocarbon formation (DOC, 2015, pp. 7-39 to 7-40). Additionally, some produced water is permitted to be recycled for irrigation and livestock watering (CCST, 2014, pp. 212 to 213). Wastewater may also be trucked or piped to an offsite private or municipal wastewater treatment plant, but this method is rarely used because it is more costly and many treatment facilities are not configured to treat wastewater with such high total dissolved solids (TDS) (DOC, 2015, p. 7-40).

Acid Matrix Stimulation

Acid matrix stimulation or matrix acidizing is practiced in California, but the majority of acid matrix stimulation also occurs in Kern County, outside of the HFO area. Acid matrix stimulation involves pumping acid into a well at a pressure low enough to prevent a reservoir rock from fracturing. Acid matrix stimulation is smaller in scope than hydraulic or acid fracturing, and is performed in one day or less. There are two types of matrix acidizing. One type of matrix acidizing, which has a volume of fluid less

than the Acid Volume Threshold[8] and typically affects an area less than 5 feet from the wellbore, is used to remove damage from drilling or scale that has built up over several years of production. This acid treatment may be used routinely over the life of a well and is not used for the purpose of well stimulation. Therefore, this acid treatment or rework is not considered in this RMP Amendment/EIS. Beyond approximately 3 to 5 feet from the wellbore, matrix acidizing is used as a well stimulation technique and is analyzed in this RMP Amendment/EIS, as described below.

The types of acid used (or not used) in acid matrix stimulation are dependent on the formation. The most common acid systems used are hydrochloric acid (HCl) in carbonate formations and hydrofluoric/hydrochloric acid (HF/HCl) mixtures in sandstone formations (CCST, 2014, p. 22). Although most acid stimulation jobs use HCl and/or a mud acid, other acids may be used, such as citric acid and formic acid. Typically acid is mixed and diluted to its final strength before arriving at the well site. For instance, raw acid (36 percent HCl) would be delivered to the service company's facility. It would then be diluted at the facility to 15 percent or lower concentration or would be blended at a ratio of 12:3 (i.e., 12 percent HCl and 3 percent HF) prior to transport to the well site. The diluted acid is typically transported to the well site in a lined 5,000-gallon tanker transport, and stored in the transport or in plastic poly tanks at the site until it is used. (DOC, 2015, p. 7-47)

At the well site, water would be blended with the already diluted acid at a 50:50 or higher ratio as it is pumped into the wellbore (e.g., at least 500 gallons of water with 500 gallons of the acid blend). A slightly greater than 50 percent ratio of water is used for jobs designed to reach farther into the formation from the wellbore (DOC, 2015, p. 7-47). Planned water use listed in notices submitted to DOGGR in December 2013 and January 2014 for such treatments ranged between 8,000 to 140,000 gallons with an average of 42,000 gallons (CCST, 2014, p. 114).

On average and depending on the job's design, an acid matrix stimulation treatment takes up to 8 hours with 3 to 10 vehicles needed. Typically each worker is assigned to a vehicle for the duration of the job, and each job requires one roundtrip to the well site for each vehicle to complete the treatment. (DOC, 2015, p. 7-47 to 7-48)

Acid Fracturing

Acid fracturing, also called fracture acidizing, accomplishes the same goal as hydraulic fracturing by injecting low pH fluids instead of proppant into a created fracture. The acid is intended to non-uniformly etch the walls of the fracture so that some fracture conductivity is maintained after the fracture closes (CCST, 2014, pp. 70-71). Acid fracturing is used primarily in carbonate reservoirs, which do not generally occur in California. Therefore, this method is rarely used within the State, and no acid fracturing treatments are anticipated within the HFO area.

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[8] According to DOGGR's final text of regulations that would amend California Code of Regulations Title 14, Division 2, Chapter 4, Subchapter 2, Article 2 (Definitions), "Acid Volume Threshold" means a volume, in U.S. gallons, per treated foot of well stimulation treatment, calculated as follows: (((Size of the drill bit diameter in inches that was used in the treated zone/ 2 + 36 inches)^2 – (bit diameter in inches/ 2)^2) × 3.14159 × 12 inches × treated formation porosity)/ 213 (inches^3/gallon). The lowest calculated or measured porosity in the zone of treated formation shall be the treated formation porosity used for calculating the Acid Volume Threshold.

6.2 Enhanced Oil Recovery

EOR is the implementation of various techniques for increasing the amount of crude oil that can be extracted from an oil field over the life of a well. EOR techniques include (1) thermal recovery using heat; (2) gas injection using carbon dioxide (CO_2), natural gas, or nitrogen; or (3) chemical injection using long-chained molecules called polymers to increase the effectiveness of waterfloods.

Gas injection accounts for nearly 60 percent of EOR production in the United States; however, it is used primarily in west Texas and the southern Rocky Mountains and not within California. Chemical techniques account for only about 1 percent of U.S. EOR production due to its relatively high cost and, in some cases, the unpredictability of its effectiveness (DOE, 2015). Chemical injection is not anticipated within the HFO area under this RFDS.

Thermal recovery, which makes up 40 percent of EOR production in the United States, is primarily used in California, and is the primary method of EOR within the HFO area (DOE, 2015). It may be used in combination with well stimulation, such as hydraulic fracturing. Methods of thermal recovery that may be used include cyclic steam injection and steam flooding. In general, steam injection forces steam into the reservoir by applying pressure, which reduces the viscosity of oil and allows it to flow more readily to production wells. Cyclic steam injection or steam cycling is a form of steam injection in which injection and production take place in the same well, which is accomplished by alternating steam injection with oil production. Steam flooding involves continuous steam injection into wells interspersed among the production wells.

Water flooding, the most widely used secondary recovery method in the country, is also used within the HFO area and includes injection of water into the reservoir, usually to increase pressure and thereby stimulate production. The water may also sweep or displace oil from the reservoir, and push it towards a well.

Flowback (if a well is stimulated) and produced water are often injected into Class II wells for EOR. Based on data provided by DOGGR, there were approximately 35,000 active Class II[9] wells in California in 2013. Approximately 5 percent of these wells were used for water and gas disposal, while the remaining were used for EOR (i.e., cyclic steam, steam flood, and water flood) (DOC, 2015, p. 10.13-15).

DOGGR first reported the portion of oil produced by water flooding and steam injection in California in 1989. It attributed 71 percent of oil production in that year to these techniques. A total of 76 percent of production in 2009, the most recent year with attribution, was due to these techniques (CCST, 2015, p. 4). Likewise, EOR is the main recovery method used within the HFO area. About 85 percent of the production from the Coalinga Field is from thermal recovery projects (DOGGR, 2010, p. 43). EOR techniques are utilized in all of the most productive oil and gas fields within the HFO area, which are discussed in Section 1 and listed as follow (DOGGR, 2010, pp. 177 to 191):

- Coalinga Oil and Gas Field with Coalinga East Extension Oil and Gas Field (steam flood, cyclic steam, and water flood);
- San Ardo Oil and Gas Field (steam flood, cyclic steam, water flood, and air injection);

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[9] Injection wells are classified by the U.S. Environmental Protection Agency into six classes according to the type of fluid they inject and where the fluid is injected. Class II wells inject fluids associated with oil and natural gas production operations. Most of the injected fluid is brine that is produced when oil and gas are extracted from the earth.

- Lynch Canyon Oil and Gas Field (cyclic steam);
- Jacalitos Oil and Gas Field (cyclic steam and water flood);
- Kettleman North Dome Oil and Gas Field (water flood); and
- Sargent-Hollister Oil and Gas Field (cyclic steam).

Therefore, similar to well stimulation technologies discussed above, it is estimated that EOR techniques (i.e., cyclic steam and steam flood) and secondary recovery techniques (water flood) may be used on any or all wells under this RFDS. Likewise, EOR and secondary recovery operations would occur entirely within the well pad and no additional ground disturbance would be anticipated beyond what is described in Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions).

6.3 Well Operations and Maintenance

During the life of a well, rework, including acid treatments, may be necessary to restore production from an existing formation when it has fallen off substantially or ceased altogether. All operations other than drilling new wells and abandoning existing wells are under the general classification "rework." Typical routine well maintenance would occur at the surface and downhole, and would consists of repair or replacement of wearable parts that have a limited service life or maintaining the tubing, wellbore or other downhole devices to maintain optimum efficiency. (DOC, 2015, p. 7-17 to 7-18)

Production operations would vary from field to field, but most are 24 hours per day, seven days per week and 365 days per year. From the production facility, most oil and gas is piped through a large network of existing crude oil pipelines to refineries clustered in the Los Angeles area, the San Francisco Bay Area (within the HFO area), and the Central Valley near Bakersfield (DOC, 2015, p. 7-19).

6.4 Plugging and Abandonment

Wells that have reached the end of their productive life (usually when the cost to operate them exceeds the value of the production) or are drilled and determined to be dry holes are plugged according to an approved engineering design for the condition of each well. Plugging involves placing cement slurry or plug at strategic depths in the hole across all fresh water zones and up to the surface and in annular spaces as needed. Drilling mud is used as a spacer between the plugs to prevent communication between fluid-bearing zones. The drill casing is cut off at least 5 feet below ground level and capped by welding a steel plate on the casing stub. After plugging, all equipment and debris would be removed and the site restored as near as reasonably possible to its original condition. It is projected that much of the surface disturbance from exploratory activities and all of the seismic activities would be of short duration (between a few months and a couple of years). The impacts from the successful development wells would last longer, but it would still be completely reclaimed eventually.

6.5 Military Bases

Fort Hunter Liggett military base is within the planning area. Leasing these lands requires consent from the local Base Commander. It has been shown in numerous cases across the country and within California that oil and gas exploration and development can often be conducted in a manner that is fully compatible with ongoing military operations. It is quite possible that negotiations between BLM and military personnel may result in agreement to lease lands within the boundaries of bases or other military lands. In the event that happens, appropriate leasing stipulations that would fully protect the military's mission will be added prior to any land being leased.

7. RFD Scenario Considered but Eliminated

Given past and current oil and gas development trends, uncertainty with development of the Monterey Formation source rock, and predicted future oil and gas development in the HFO area, exploratory drilling is not expected to lead to the discovery and development of a large new producing field in the planning area within the 15 to 20 year projections included in this RFDS and the RMP Amendment/EIS. Any field discovered would likely be small (a few hundred acres or less). Furthermore, if a new field were developed, given the share of federal mineral estate within the HFO area, the location of the areas of high and moderate oil and gas occurrence potential, and past and current trends of oil and gas development on private land, this field would not likely be located on federal mineral estate. Nonetheless, BLM considered the following scenario, which describes the operations and effects associated with field development.

The surface disturbance and well density assumptions for a new field would be similar to those included in Section 5 (Estimated Surface Disturbance). If a field containing BLM-administered federal mineral estate were to be discovered in the northern portion of the HFO area, it is likely that the discovery would be gas because all of the occurrences in that area are gas. Conversely, if a field containing federal mineral estate were to be discovered in the southern portion of the HFO area, it is likely that the discovery would be oil because all of the occurrences in that area are oil.

A planning assumption that BLM considered would be for discovery of a small- to mid-size oil field, or an equivalent level of oil and gas development in the HFO area within and nearby to active fields. The average field size in the HFO area is over 1,900 acres, but that is significantly skewed by the presence of a few very large fields. The smallest 80 percent of the active fields in the HFO area have an average size of 650 acres, about one square mile.

If a single new oil and gas field of 650 acres was discovered, on average it would contain 11.6 percent federal mineral estate, about 75 acres (see Table 1 in Section 1). At a spacing of 5 to 7 acres per well, it would take approximately 13 wells to fully develop the 75-acre federal parcel. In the highly unlikely event that this new oil and gas field were to be located entirely on federal mineral estate, then up to approximately 108 wells would be drilled under this maximum level of development scenario. The basic assumptions are summarized in Table 9 (Oil and Gas Development Scenario Assumptions Considered but Eliminated).

Table 9. Oil and Gas Development Scenario Assumptions Considered but Eliminated

	Assumption	Basis of Assumption
New/Additional Fields Discovered	1	Discovery of a small- to mid-size oil field.
New/Additional Oil and Gas Fields Area	75 to 650 acres	Average active field size for smaller fields in this area is 650 acres; approximately 11.6 percent of HFO area is federal mineral estate.
Assumed Well Spacing	5 to 7 acres per well	Typical well density in existing larger oil fields in HFO area.
New/Additional Wells (development)	13 to 108 wells	Result of well spacing across the range of new/additional area of fields (i.e., high end is 108 wells spaced at ~6 acres per well over 650 acres of a new field located entirely within federal mineral estate).

Based on the surface disturbance assumptions in Table 8 (Reasonably Foreseeable Development Scenario Surface Disturbance Assumptions), the maximum total surface disturbance for 108 development wells in a new field would be 108 acres for well pads, 518 acres for roads, and 24 acres for 10 miles of

transmission pipeline. No more than 1 acre would be required for the small facility (meter, separator) on each parcel. For planning purposes, it is assumed that the wells may be on 10 separate parcels, so there would be a total of 10 acres for facilities. The total surface disturbance caused by development of the new field would be up to 660 acres.

However, based on the updated oil and gas occurrence potential as well as predicted future oil and gas development in the HFO area discussed herein, this field development scenario is extremely unlikely to occur. Therefore, it was considered, but not incorporated in this RFDS.

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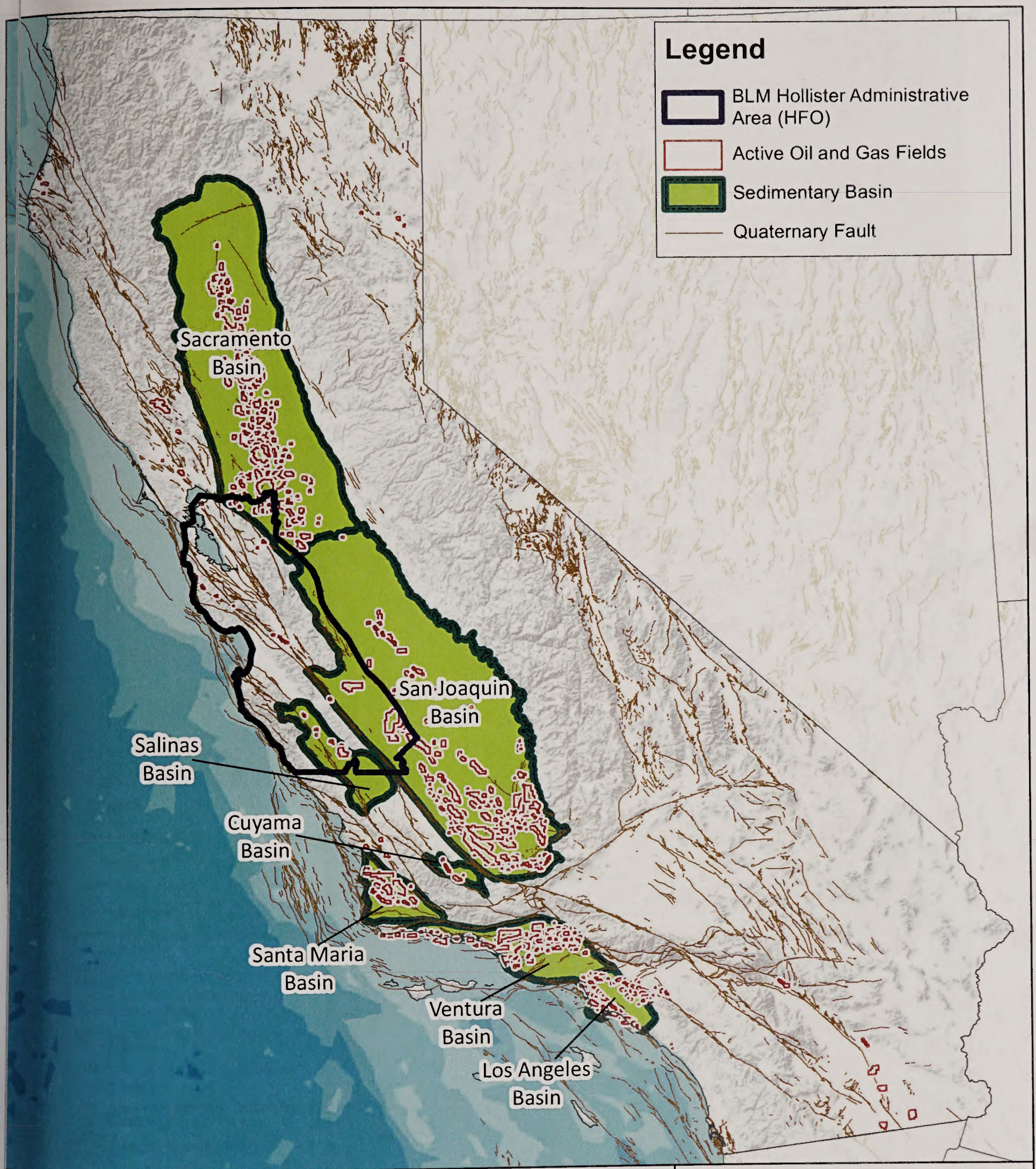
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Map Reference:
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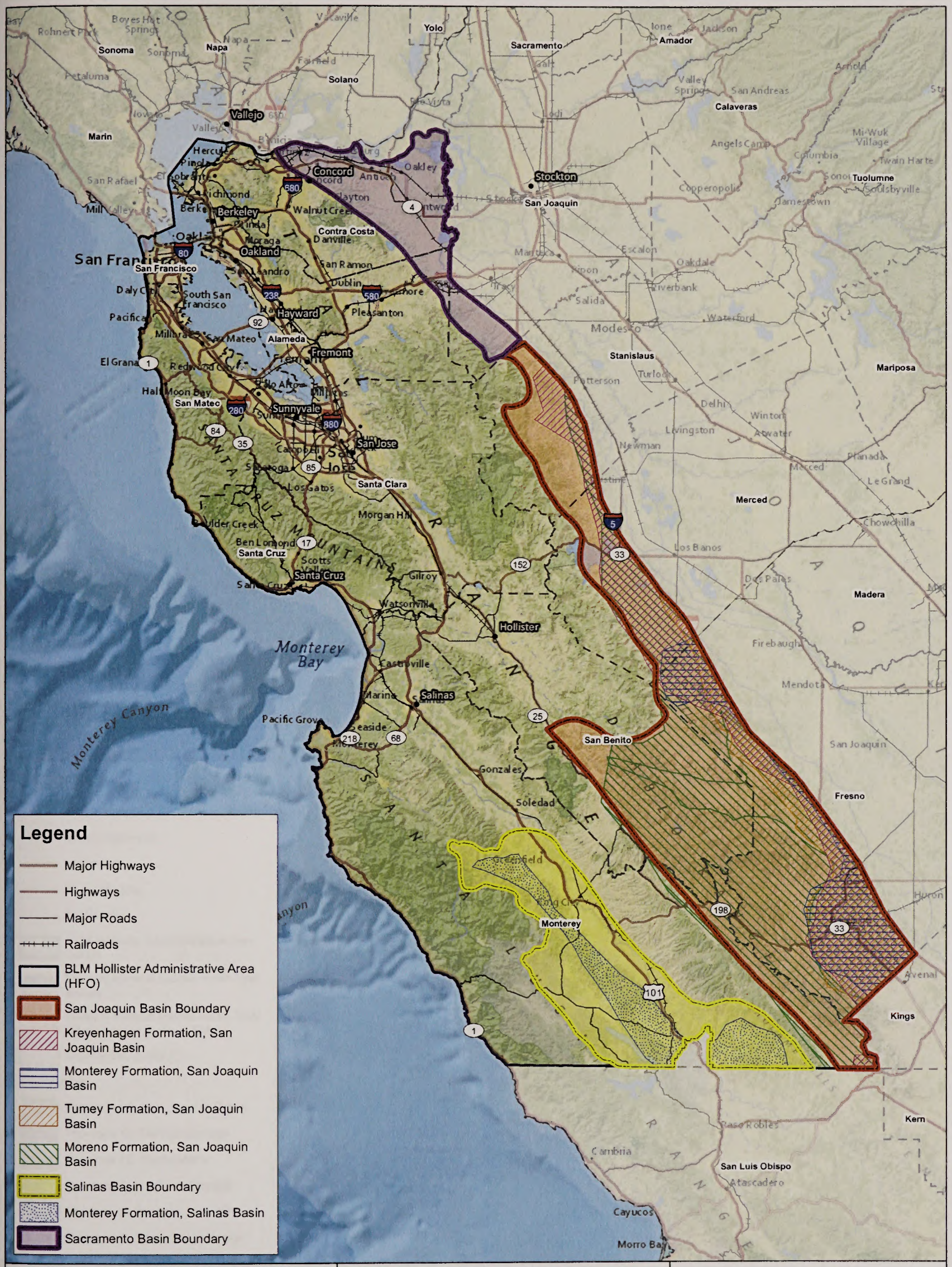
BUREAU OF
LAND MANAGEMENT

HOLLISTER FIELD OFFICE

Figure 1

Major Sedimentary Basins and Faults in California

Date: October 2015



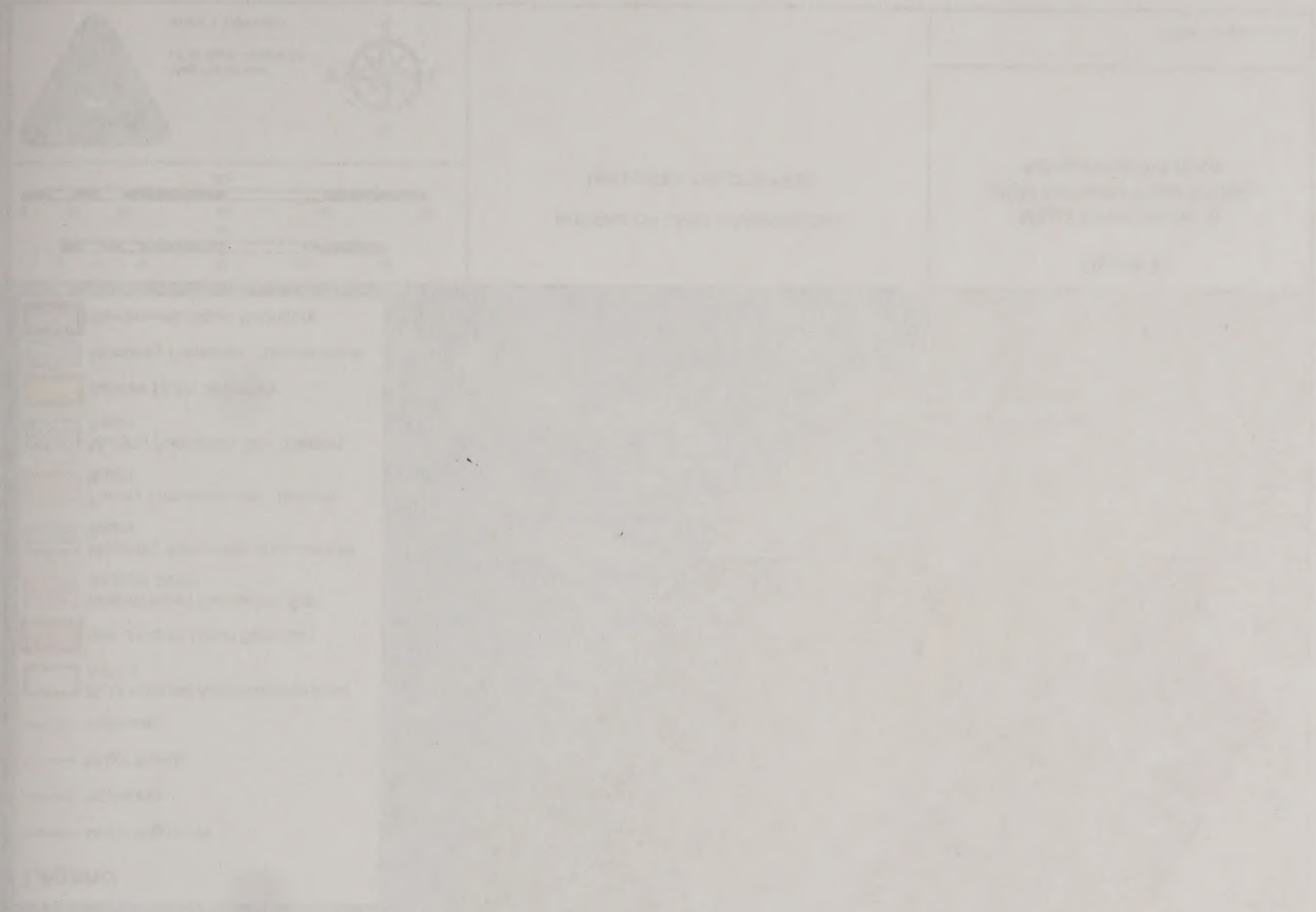
BUREAU OF LAND MANAGEMENT

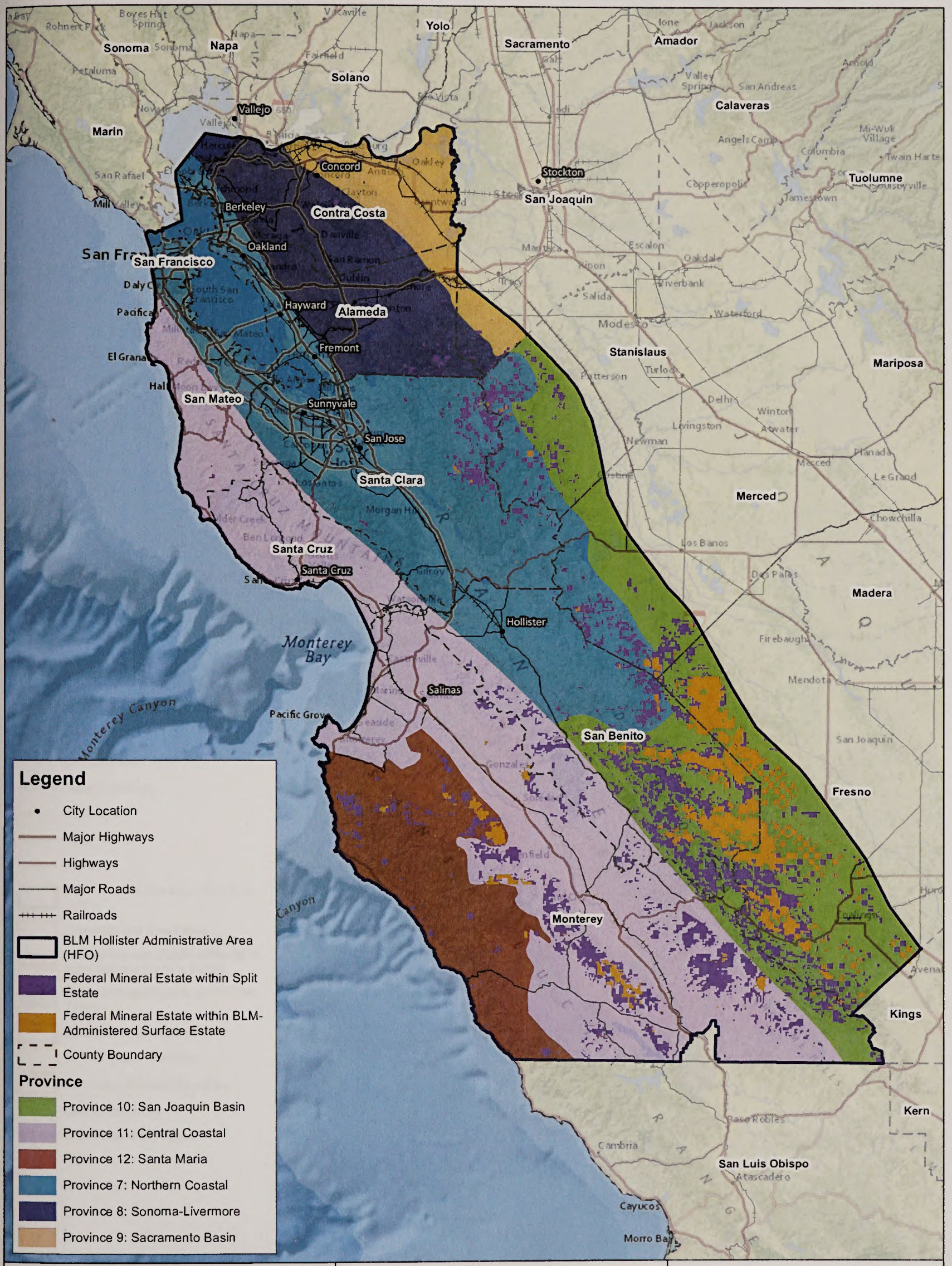
HOLLISTER FIELD OFFICE

Figure 2

Major Formations in BLM Hollister Field Office Administrative Area

Date: October 2015





BUREAU OF LAND MANAGEMENT

HOLLISTER FIELD OFFICE

Figure 3

Oil and Gas Provinces within the BLM Hollister Field Office Administrative Area

Date: October 2015

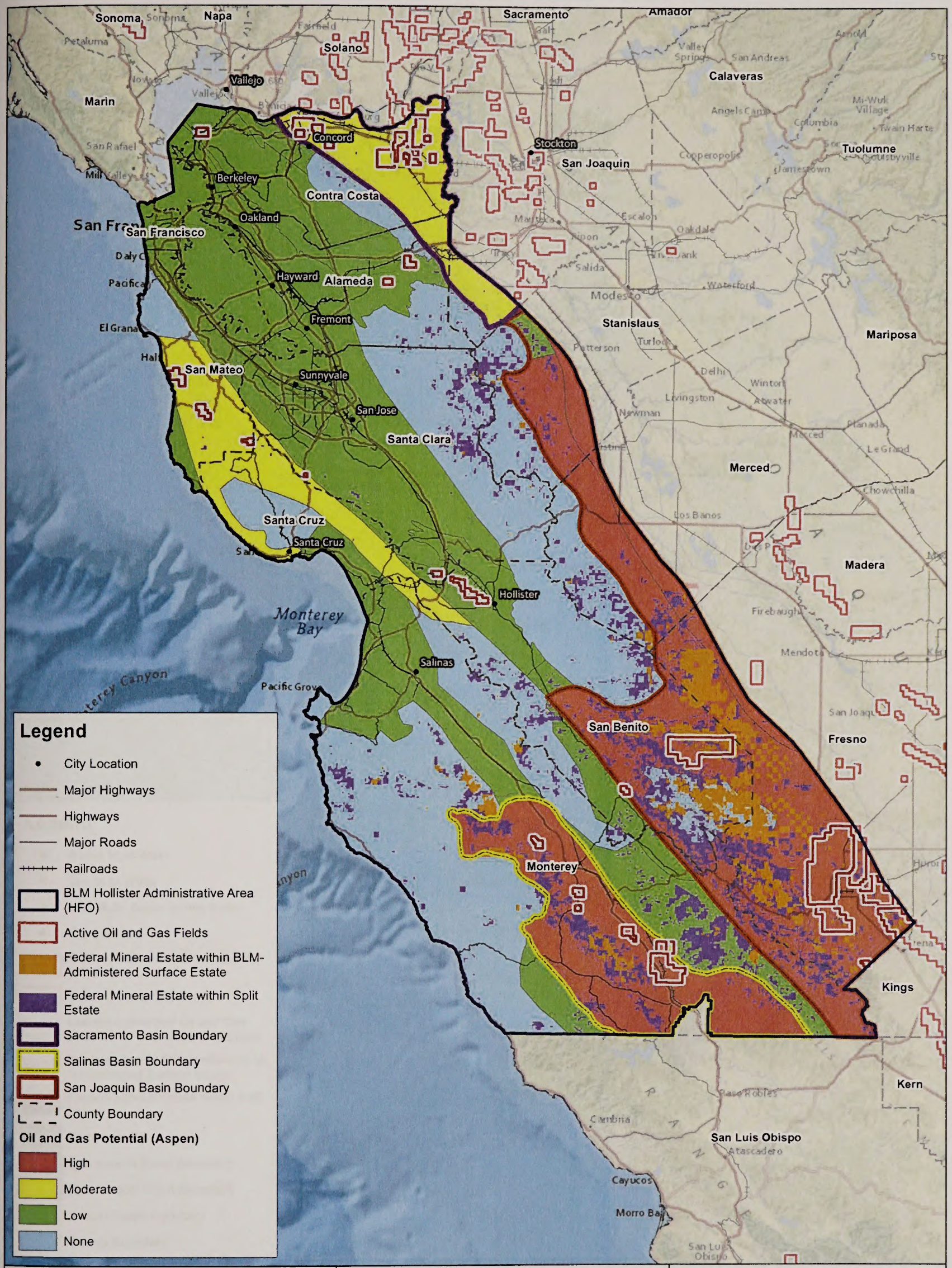
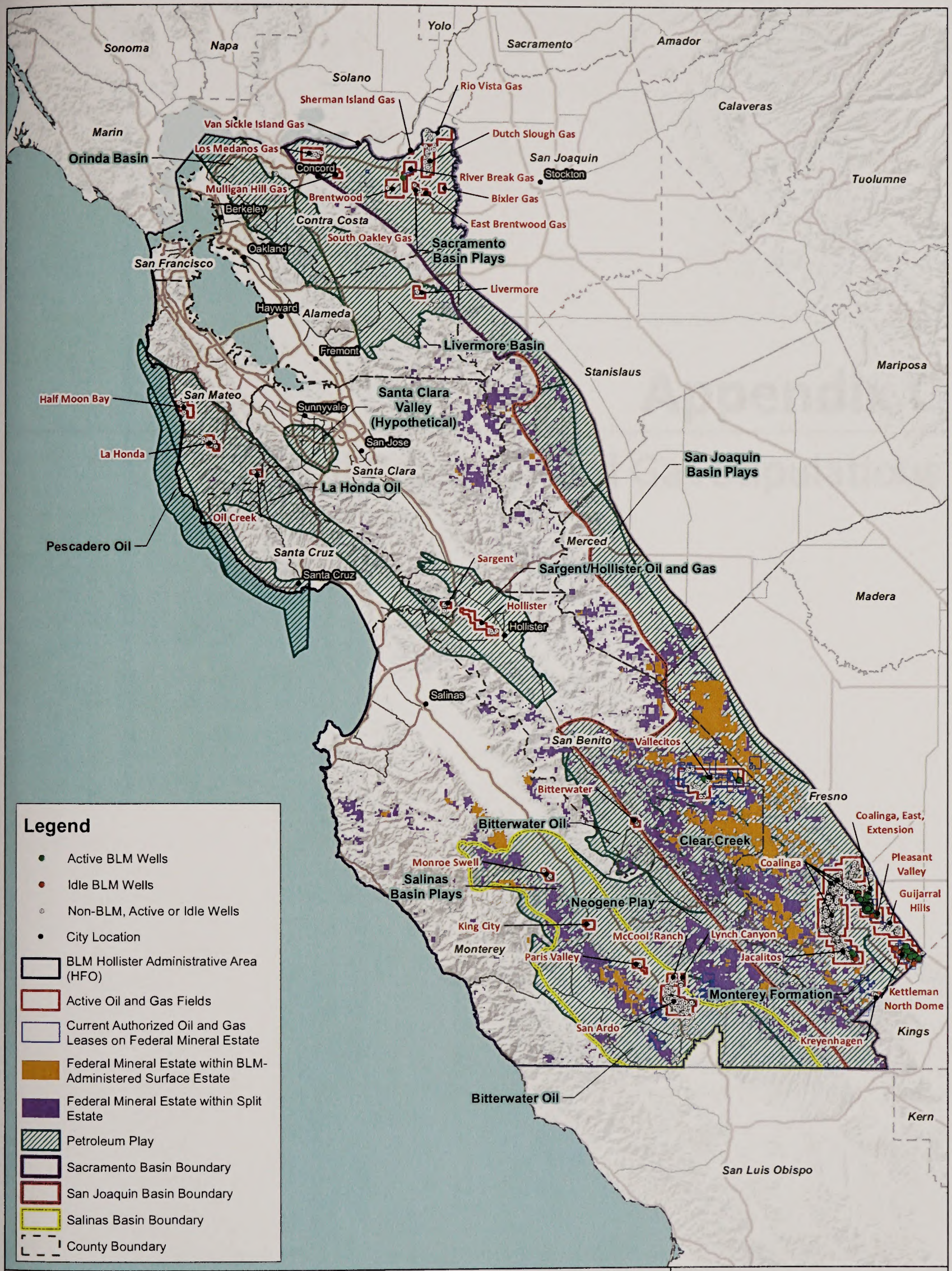


Figure 4.

Reasonably Foreseeable Oil and Gas Occurrence Potential

Date: October 2015



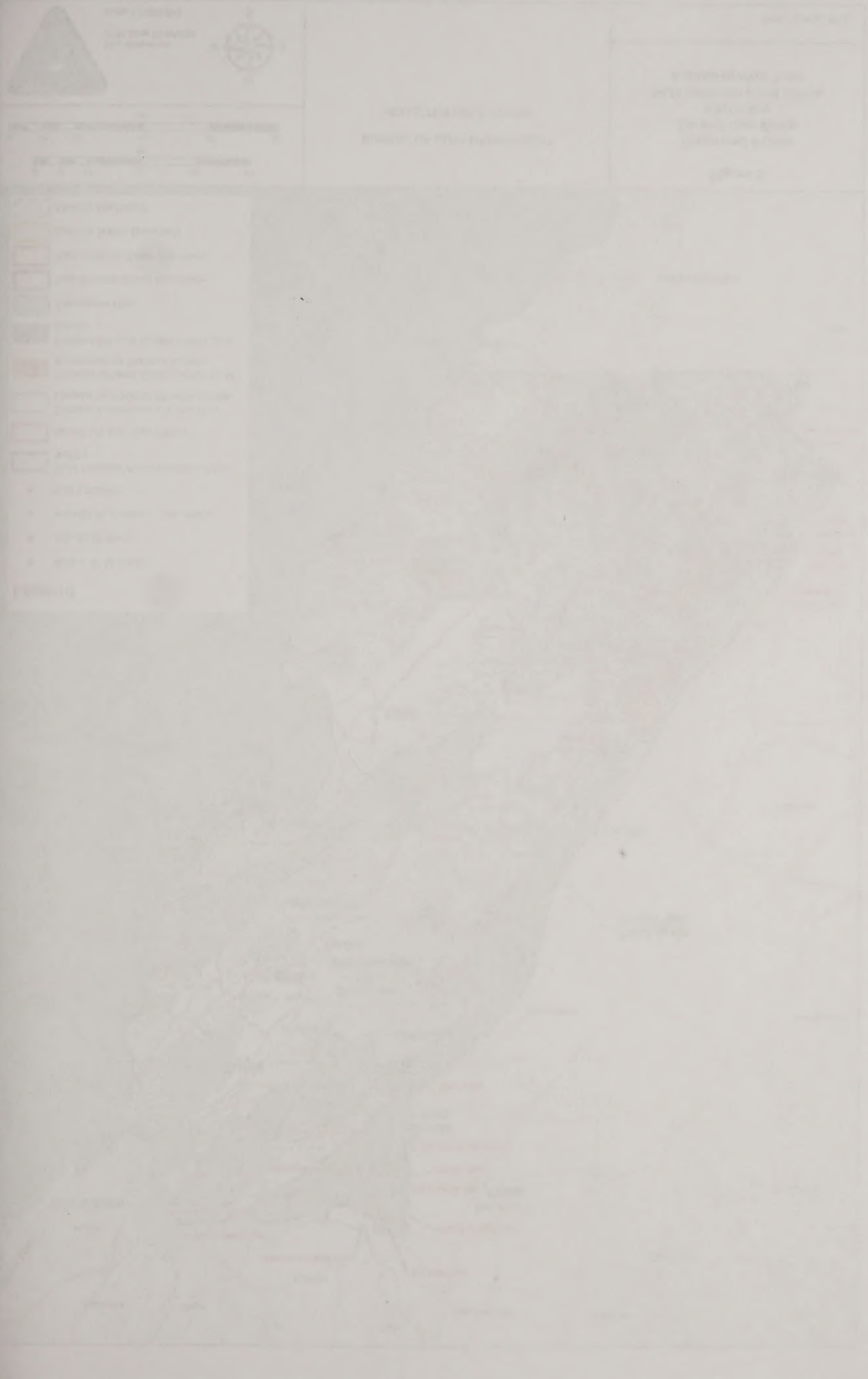
BUREAU OF LAND MANAGEMENT

HOLLISTER FIELD OFFICE

Figure 5

Plays and Active Oil and Gas Wells within the BLM Hollister Field Office Administrative Area

Date: October 2015



Appendix C

Central Coast Oil and Gas Stipulations

Appendix C

Central Coast Oil and Gas Stipulations

Appendix C.
Central Coast Oil and Gas Stipulations

No Surface Occupancy

General

All or a portion of this lease has been identified by the current RMP (e.g., ACECs and areas of ecological importance with this stipulation prescribed) as containing unique or significant natural or cultural values. No new surface disturbing activity is allowed on the lease. This stipulation may be granted exception, modified, or waived as follows:

Exception: The Authorized Officer may grant an exception if after discussion with an appropriate agency (e.g., CDFW, SHPO, and USFWS) it decides that an environmental review determines the action as proposed or conditioned would not impair the values present because of temporary conditions.

Modification: The Authorized Officer may modify this stipulation to allow surface use on a portion or even all of the lease if an environmental review determines the action as proposed or conditioned would not impair the values present.

Waiver: The Authorized Officer may grant a waiver if an environmental review determines the values for which the NSO was applied no longer exist.

Objective: To minimize or eliminate adverse effects on unique or significant natural and cultural resources that are incompatible with fluid mineral development.

Application: The NSO-General stipulation would be applied when adequate protection of surface resources cannot be provided through mitigation, and fluid mineral development of the lease from an off-site location is recommended. If there is no surface location available for directional drilling, the land would not be leased.

Review Process: Any proposed surface-disturbing activity would be reviewed to determine whether it is in compliance with the NSO stipulation. If the review determines the proposed action would not impair the values present and would be consistent with the management of the ACEC or area of ecological or cultural importance, exception or modification may be granted. Any decision to grant an exception or modification would be based on field inspection and inventory and the NEPA review process.

Controlled Surface Use

CSU – Defense

All or a portion of this lease contains federal mineral estate under the surface administration of the Department of Defense. Surface disturbing activities may be moved, modified, or prohibited at the discretion of the Base Commander(s) to ensure these activities do not interfere with military activity on the base and to ensure personnel safety. Furthermore, processing times for

proposed actions may be delayed beyond established standards to accommodate review and coordination with the Base Commander(s). This stipulation shall not be modified or granted exception; however, it may be waived as follows:

Waiver: The Authorized Officer may grant a waiver to this stipulation if the surface administration changes from the Department of Defense to another entity.

Objective: To minimize or eliminate conflict between fluid mineral development and military base operations.

Application: The CSU-Defense stipulation would be applied to federal reserved mineral estate under the surface administration of the Department of Defense. Coordination with local government agencies regarding the development of stipulations would be at the discretion of the base commander.

When a tract of land on a military installation is nominated for lease sale, the legal description of the tract of interest would be forwarded to the attention of the base commander. The base commander would respond to the BLM with the recommended wording of the CSU-Defense stipulation. The wording would vary based on the base mission and would be applied to the entire military installation or to a limited portion of the parcel, at the discretion of the base commander. The BLM may alternatively identify in advance of lease sale offerings the terms and conditions applicable to military installations and thus be able to offer the leases for bid with advance disclosure of the terms and conditions.

Review Process: Generally, the following procedure would be used to approve surface disturbing activities on leases with the CSU-Defense stipulation. The proposed activity would be reviewed to determine if the mission of the military installation would be affected. The review process would involve meetings coordinated by the BLM between the lessee and the representatives of the military base to determine impacts and potential effects.

Approval: If the review determines that the mission of the military installation would not be affected Bureau approval of the proposed activity would normally be granted within 30 days of the review. If the review determines that the mission of the military installation would be adversely affected, the BLM would coordinate with the Base Commander and the applicant to modify the proposal. Modifications may include movement of activities, seasonal restrictions, mitigation and/or compensation. Modified proposals would be developed cooperatively with the applicant to ensure that the modified project still meets the applicant's objective.

CSU – Protected Species

All or a portion of the lease occurs within the range of one or more plant or animal species that are either listed or proposed for listing as threatened or endangered by the USFWS. A list of such species will be provided at the time of leasing and updated as necessary over the term of the lease. To determine whether species on this list or their habitat are present, a preliminary environmental review will be conducted for all surface disturbing activities. Presence of habitat or species may result in the proposed action being moved, modified, or delayed to mitigate project effects. Offsite compensation that would satisfactorily offset the loss of habitat may be

required. Prohibition of all surface disturbing activities on the lease will only occur as needed to avoid jeopardizing the continued existence of a listed or proposed species, or when the proposed action is inconsistent with the recovery needs of a species as identified in an approved USFWS Recovery Plan through consultation with USFWS. Furthermore, processing times for proposed actions may be delayed beyond established standards to accommodate species surveys, and consultation or conferencing with the USFWS. This stipulation shall not be waived; however, it may be modified or an exception may be granted as follows:

Exception: The Authorized Officer may grant an exception if an environmental review determines the action as proposed or conditioned would have no effect on listed or proposed species.

Modification: The Authorized Officer may modify this stipulation to reflect new information with regard to the range of listed or proposed species through the expansion or reduction of lands subject to this stipulation for a specific species.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on federally proposed and listed species.

Application: At the time of leasing, the CSU-Protected Species stipulation would be attached to all leases within the range of federally listed or proposed species. A list of protected species found within the Field Office boundary would be included with the stipulation for each lease at the time of leasing. This list may be updated at the time of APD/NOS submittal.

Review Process: Generally, the following process would be used to approve surface-disturbing activities on leases with the CSU-Protected Species stipulation. The proposed activity would be reviewed to determine if listed or proposed species would be affected. This review may involve site-specific surveys for plant and animal species conducted according to established methods that may specify certain seasons or other conditions. In some cases, this may mean that a survey cannot be completed until the next growing season for some plant species or after seasonal appearance for some animal species.

If the review determines that listed or proposed species would not be affected, an exception to the stipulation and approval of the application would normally be granted within 30 days of the review.

If the review were to determine that listed or proposed species may be affected, but in a beneficial, insignificant, or benign manner, and written concurrence is received from the USFWS, approval of the application would normally be granted within 30 days of receiving USFWS concurrence. There is no regulatory timeframe for USFWS to provide their written concurrence.

If it is determined that a listed or proposed species may be adversely affected, the BLM would work with the applicant to modify the proposal to minimize impacts. Modifications may include movement of activities, seasonal restrictions, mitigation, or compensation. Modified proposals would be developed with the applicant to ensure that the modified project still meets the

applicant's objective. If the modified project would still adversely affect a listed or proposed species, the BLM would begin formal consultation or conference with the USFWS.

Coordination with the USFWS on Listed Species: Currently there are two options for meeting the formal consultation requirement. A new consultation may be initiated or a previously completed formal consultation may be used.

If a new consultation were initiated, the USFWS would issue a document, called the biological opinion. The USFWS has up to 135 days to complete a biological opinion, and it may request a 60-day extension. Extensions beyond 195 days require the consent of an applicant.
A previously completed formal consultation may also be used to meet the formal consultation requirement.

Upon completion of a new consultation or determination that a previously completed consultation can be used, approval of the application will normally be granted within 30 days. If the new consultation concludes that a listed species may be jeopardized, then surface disturbance will be prohibited on the lease.

Surface disturbance will also be prohibited if the consultation concludes that the proposed action is inconsistent with the recovery needs of the listed species as identified in an approved USFWS Recovery Plan. Although Recovery Plans are not requirements, BLM has voluntarily chosen to apply their recommendations through the land use plan, and these recommendations are reflected in this stipulation.

Coordination with the USFWS on Proposed Species: BLM policy requires a conferencing with the USFWS on any action that may adversely affect proposed species. Depending on the complexity of the situation, a conference may be completed in a single telephone conversation or may require the time frames of a consultation. Generally, on completion of the conference, approval of the application will be granted within 30 days.

If the conference were to show that a proposed species may be jeopardized, surface-disturbing activities would be prohibited on the lease.

Final Approval: Final approval of applications that would have no effect on listed or proposed species would normally be granted within 30 days of the review.
Final approval for projects that may affect listed or proposed species in a beneficial, insignificant, or benign manner would normally be granted within 30 days of receiving USFWS written concurrence.

For projects that require consultation or conference with the USFWS, final approval would normally be granted within 30 days of consultation or conference completion. Conditions of approval would include any conditions specified by the BLM or USFWS for minimizing impacts.

CSU – Critical Habitat

All or a portion of this lease lies within an area that is designated as critical habitat, or is proposed for designation as critical habitat by the USFWS. A list of these areas affecting this lease will be provided at the time of leasing and will be updated as necessary over the term of the lease. Any proposed surface disturbing activity occurring on the affected portions of this lease will be reviewed to determine if the activity would affect designated or proposed critical habitat. Determination of effects to designated or proposed critical habitat may result in the proposed action being moved, modified, seasonally restricted, or delayed. Consultation or conference with the USFWS is required if designated or proposed critical habitat may be affected. Off-site compensation that would satisfactorily offset the loss of habitat may be required. Prohibition of all surface disturbing activities on the lease will only occur as needed to avoid destroying or adversely modifying critical habitat or proposed critical habitat, or when the proposed action is inconsistent with the recovery needs identified in an approved USFWS Recovery Plan based on consultation with USFWS. Furthermore, processing times for proposed actions may be delayed beyond established standards to accommodate species surveys, and consultation or conferencing with the USFWS. This stipulation shall not be waived; however, it may be granted exception or modified as follows:

Exception: The Authorized Officer may grant an exception if an environmental review determines the action as proposed or conditioned would have no effect on critical habitat or proposed critical habitat.

Modification: The Authorized Officer may modify this stipulation to reflect new information with regard to the critical habitat or proposed critical habitat through the expansion or reduction of lands subject to this stipulation for a specific species.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on habitat designated as critical, or is proposed for designation as critical habitat by the USFWS.

Application: The CSU-Critical Habitat stipulation would be applied to leases in areas that are designated as critical habitat or that are proposed for designation as critical habitat for certain species. A list of species and parcels would be included with the stipulation for each lease. The USFWS designates or proposes critical habitat according to the regulations found in 50 CFR 424. Critical habitat is one of the following:

- Specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Endangered Species Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) that may require special management considerations or protection, and
- Specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary that such areas are essential for conservation of the species (50 CFR 424.02).

Review Process: Generally, the following process would be used to approve surface-disturbing activities on leases with the CSU-Critical Habitat stipulation. The proposed activity would be reviewed to determine if designated or proposed critical habitat would be affected. This review

may involve site-specific surveys for plant and animal species, conducted according to established methods, which may specify certain seasons or other conditions. In some cases this may mean that a survey cannot be completed until the next growing season for some plant species or after seasonal appearance for some animal species.

If the review determines that designated or proposed critical habitat will not be affected, an exception to the stipulation would be granted, and approval of the application will normally be granted within 30 days of the review.

If the review determines that designated or proposed critical habitat may be affected, but in a beneficial, insignificant, or benign manner, and written concurrence is received from the USFWS, the application would normally be approved within 30 days of receiving USFWS concurrence. There is no regulatory timeframe for USFWS to provide their written concurrence.

If it is determined that designated or proposed critical habitat may be adversely affected, BLM would work with the applicant to modify the proposal to minimize impacts. Modifications may include relocating activities, seasonal restrictions, mitigation, and compensation. Modified proposals would be developed with the applicant to ensure that the modified project still meets the applicant's objective. If the modified project were to still adversely affect designated or proposed critical habitat, the BLM would initiate formal consultation or conference with the USFWS.

Coordination with the USFWS on Designated Critical Habitat: The BLM is required to initiate formal consultation with the USFWS for any action that may affect designated critical habitat. As a result of the consultation, the USFWS would issue a biological opinion within 135 days, and it may request a 60-day extension. Extensions beyond 195 days require the consent of an applicant.

As part of the biological opinion, the USFWS would determine if the proposed action would be likely to destroy or adversely modify critical habitat. Destruction or adverse modification of critical habitat means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include those adversely modifying any of the physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

If consultation concludes that critical habitat would be destroyed or adversely modified, then surface disturbance would be prohibited on the affected portion of the lease. Surface disturbance also would be prohibited if the consultation were to conclude that the proposed action is inconsistent with the recovery needs of the listed species, as identified in an approved USFWS recovery plan.

Coordination with the USFWS on Proposed Critical Habitat: BLM policy requires conferencing with the USFWS on any action that may adversely affect proposed critical habitat. Depending on the complexity of the situation, a conference may be completed in a single telephone conversation or may require the time frames of a consultation. Generally, on completion of the conference, the application would be approved within 30 days. If the

conference were to show that proposed critical habitat would be destroyed or adversely modified, then surface disturbance would be prohibited on the affected portion of the lease.

CSU – Sensitive Species

All or a portion of this lease is within the range of one or more plant or animal species that are either federal candidates for listing as threatened or endangered (federal candidate), are listed by the State of California as threatened or endangered (state listed), or are designated by the BLM as sensitive (BLM sensitive). A list of species will be provided at the time of leasing and updated as necessary over the term of the lease. To determine whether species on this list or their habitat are present, a preliminary environmental review will be conducted for all surface disturbing activities. Presence of habitat or species may result in the proposed action being moved more than 200 meters (656 feet) but not more than a quarter-mile or off of the lease and prohibition of activities during seasonal use period. Furthermore, processing times for proposed actions may be delayed beyond established standards to accommodate species surveys, and coordination with the USFWS and California Department of Fish and Game. This stipulation shall not be waived; however, it may be granted exception or modified as follows:

Exception: The Authorized Officer may grant an exception if an environmental review determines the action as proposed or conditioned would have no effect on federal candidate, state listed, and BLM sensitive species.

Modification: The Authorized Officer may modify the stipulation to reflect new information with regard to federal candidate, state listed or BLM sensitive species lists. Furthermore, the authorized officer may modify the maximum distance that a potential location could be moved to extend farther than the stated quarter-mile to maintain the sensitive species protection goals.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on federal candidate, state listed, and BLM sensitive species.

Application: The CSU-Sensitive Species stipulation would be attached to all leases that are within the range of a federal candidate, state listed or BLM sensitive species. A list of sensitive species within the Field Office boundary would be included with the stipulation for each lease when the lease is issued.

Review Process: Generally the following process would be used to approve surface-disturbing activities on leases with the CSU-Sensitive Species stipulation. The proposed activity would be reviewed to determine if special status species would be affected. This review may involve site specific surveys for plant and animal species, conducted according to established methods that may specify certain seasons or other conditions. In some cases this may mean that a survey cannot be completed until the next growing season for some plants or after seasonal appearance for some animal species.

If the review determines that a special status species may be adversely affected, then surface disturbing activities may be relocated up to a quarter-mile, but not off the lease, and certain surface disturbing activities may be prohibited during seasonal periods. BLM policy may also require coordination with the USFWS or California Department of Fish and Game.

CSU – Priority Species, Plant Communities and Habitats

All or a portion of the lease has been identified by the current RMP (i.e., ACECs and areas of ecological importance with this stipulation prescribed) as containing priority species, plant communities, or habitat that may be adversely affected by fluid mineral development. A list of affected parcels or portions of the lease will be provided at the time of leasing. To identify the possibility of adverse impact resulting from fluid mineral development, a preliminary environmental review will be conducted for all surface disturbing activities. Identification of adverse impacts may result in the proposed action being moved, modified, seasonally delayed, or prohibited from all or a portion of this lease. Furthermore, processing times for proposed actions may be delayed beyond established standards to accommodate species surveys. This stipulation shall not be waived, but may be granted exception or modified as follows:

Exception: The Authorized Officer may grant an exception if an environmental review determines the action as proposed or conditioned would have no effect on priority species, plant communities, or habitats.

Modification: The Authorized Officer may modify the stipulation to reflect new information with regard to the presence of priority species, plant communities, or habitat through the expansion or reduction of lands subject to this stipulation.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on priority species, plant communities, or habitat.

Application: The CSU-Priority Species, Plant Communities and Habitats stipulation would be applied to specific areas that contain unique or significant biological and botanical values as described in the RMP (i.e., ACECs and areas of ecological importance).

Review Process: Generally the following process would be used to approve surface-disturbing activities on leases with the CSU- Priority Species, Plant Communities and Habitats stipulation: The proposed activity would be reviewed to determine if the values for which the area was recognized would be affected. This review may involve site-specific surveys for plant species, conducted according to established methods, which may specify certain seasons or other conditions. In some cases this may mean that a survey cannot be completed until the next growing season for some plants species. If the review were to determine that the values for which the area was recognized may be adversely affected, then surface-disturbing activities may be moved, modified, or prohibited on portions of or the entire lease and certain activities may be prohibited during seasonal periods.

CSU – Raptor

All or a portion of this lease has been identified as an important raptor foraging, wintering, or nesting area. Any proposed surface disturbing activity will be reviewed to determine if the activity would affect raptor foraging, wintering, or nesting habitat. Determination of effects to raptor foraging, wintering, or nesting habitat may result in the proposed action being moved more than 200 meters (656 feet) but not more than a half-mile and prohibition of activities during seasonal use period. This stipulation may be granted exception, modified, or waived as follows:

Exception: The Authorized Officer may grant an exception if the operator submits a plan that demonstrates that impacts from the proposed action are minimal or can be adequately mitigated.

Modification: The Authorized Officer may modify the distance and other provisions of this stipulation based on new information and increasing or decreasing levels of the impacts a nticipated from fluid mineral development.
Waiver: The Authorized Officer may waive the stipulation should new information show the area no longer contains sensitive raptor habitat for foraging, winter roosting, or nesting.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on sensitive raptor foraging areas, winter roosting areas, or nest sites.

Application: The CSU-Raptor stipulation would be applied to lands that have been identified as important raptor foraging, wintering, or nesting areas. Such lands include, but are not limited to, the Hopper Mountain, Kaweah, Kettleman Hills, Chico Martinez, Temblor, Caliente Mountain, and the San Joaquin River Gorge areas.

Review Process: Generally, the following process would be used to approve surface-disturbing activities on leases with the CSU-Raptor stipulation. The proposed activity would be reviewed to determine if sensitive raptor foraging areas, winter roosting areas, or nest sites would be affected. If the review were to show that sensitive raptor use areas may be adversely affected, then surface-disturbing activities may be relocated up to one-half mile or certain activities may be prohibited during seasonal periods. Modified proposals would be developed with the applicant to ensure that the modified project still meets the applicant's objective.

Different raptor species and different individuals vary in their sensitivity and ability to habituate to disturbances. Type and extent, duration and timing, and visibility of disturbance and influence of other environmental factors, such as topography, also affect the significance of the disturbance in any particular case. Often, moving an activity out of visibility, such as behind a topographic feature, would be sufficient. Delaying certain new activities until young birds have fledged is also a common tactic. Movement of surface-disturbing activities to retain roost trees or hunting perches may also be used.

The following species or groups of species would be eligible for protection under the CSU-Raptor stipulation: golden eagle, bald eagle, black-shouldered kite, northern harrier, sharp-shinned hawk, Cooper's hawk, northern goshawk, red-shouldered hawk, red-tailed hawk, Swainson's hawk, rough-legged hawk, ferruginous hawk, osprey, American kestrel, merlin, prairie falcon, peregrine falcon, and all owl species.

CSU – Known Cultural Resources
All or a portion of the lease contains National Register-listed or potentially eligible cultural properties that may be adversely affected by fluid mineral development. A list of affected parcels or portions of the lease will be provided at the time of leasing. To identify the possibility of adverse impacts resulting from fluid mineral development, a preliminary cultural resource review/survey will be conducted for all surface disturbing activities. Identification of adverse impacts may result in the proposed action being moved or modified. Surface-disturbing activities

would be prohibited on the portion of the lease where National Register-listed properties or properties potentially eligible for listing on the National Register occur. This stipulation may be modified, waived, or granted exception as follows:

Exception: The Authorized Officer may grant an exception, with concurrence from the California State Historic Preservation Office and Native American tribes, if a subsequent formal eligibility evaluation indicates the cultural property is ineligible.

Modification: The Authorized Officer may modify the stipulation to reflect new information from formal eligibility evaluations for cultural properties through the expansion or reduction of land where surface disturbing activities would be prohibited.

Waiver: The Authorized Officer may grant a waiver to the stipulation should the results of formal eligibility evaluation determine all cultural properties ineligible for listing on the National Register.

Objective: To minimize or eliminate adverse effects associated with fluid mineral development on known National Register-listed or potentially eligible cultural properties.

Application: The CSU–Known Cultural Resources stipulation would be applied to lands that contain known National Register-listed or potentially eligible cultural properties. The locations and number of acres affected would be determined at the leasing stage.

Review Process: Generally, the following process would be used to approve surface-disturbing activities on leases with the CSU-Known Cultural Resources stipulation. The proposed surface disturbing activity would be reviewed to determine if a known National Register- listed or potentially eligible cultural property would be affected. If the review were to show that the cultural property may be adversely affected, then surface-disturbing activities would be relocated or modified. Surface-disturbing activities would be prohibited on the lease only where the proposed action would be likely to destroy or adversely affect a known National Register listed property or properties found eligible for listing on the National Register.

CSU – Existing Surface Use/Management

All or a portion of the lease contains federal mineral estate underlying surface with an established use or management that may be incompatible with fluid mineral development. A preliminary environmental review will be conducted for all surface disturbing activities to identify possible conflict between surface use and fluid mineral development. Surface disturbing activities may be moved, modified, or prohibited to accommodate the existing surface use should the Authorized Officer determine the incompatibility of these uses. Specifically, fluid mineral development shall not occur:

> (1) Closer to any development (e.g., public highway, institution, place of public assembly, or occupied dwelling) than allowed by the county/city regulation or statue applicable to the area in which the proposed action occurs (including those exceptions where closer spacing is allowed);

(2) In a manner that significantly and adversely impacts natural and/or cultural resources of which the surface owner/administrator is charged with the management and protection; or

(3) In a manner that significantly and adversely impacts existing recreation opportunity of which the surface owner/administrator is charged with the management and protection.

Furthermore, processing times for proposed actions may be delayed beyond established standards to accommodate review and coordination with the surface owner/administrator. This stipulation shall not be waived, but may be granted exception or modified as follows:

Exception: The Authorized Officer may grant an exception where a surface use agreement exists between the lessee and surface owner/administrator that allows for the proposed fluid mineral development. Furthermore, exception may be granted where the proposed action is deemed, following an environmental review, to have discountable or insignificant impacts on the existing surface use.

Modification: The Authorized Officer may modify this stipulation to further restrict surface use for mineral development on a portion of or all the lease if a more stringent requirement with regard to the location of facilities is deemed necessary following an environmental review (e.g., greater than county/city restrictions on fluid mineral development).

Objective: To minimize or eliminate conflict between fluid mineral development and existing surface uses on both public lands and split estate over federal minerals, and to reduce impacts associated with fluid mineral resource development on the owners/occupants within a dwelling or structure on split estate lands.

Application: The CSU-Existing Surface Use/Management stipulation would be applied to areas where the authorized officer determines that pre-existing surface management uses/conditions would be incompatible with or preclude oil and gas operations from using the surface of a portion or even all of the leased land. The locations and number of acres affected would be determined at the leasing stage.

Review Process: Generally the following process would be used to approve surface-disturbing activities with the CSU-Existing Surface Use/Management stipulation. The proposed activity would be reviewed cooperatively with the surface manager to determine if it is compatible with the existing uses/conditions, and if not, the activity would be moved or possibly even denied/rejected.

CSU – Well Stimulation Technologies

In reservoirs that have previously undergone hydraulic fracturing, matrix fracturing, or matrix acidization (collectively Well Stimulation Technologies, or WST) or the geologic setting indicates a probability that WST will be required for extraction; oil and gas permit applications that propose the completion or recompletion of a production well will not be approved until BLM receives sufficient information on proposed or anticipated site-specific WST activities and an associated plan to monitor and mitigate for impacts to ground water and surface water resources. The operator may meet these data requirements by providing BLM with information

required by California State Senate Bill 4 (SB4) for either the well under consideration or a nearby well targeting the same reservoir. Applicable SB4 information includes, but is not limited to, the permit application, Water Management Plan, Water Monitoring Plan, and, if available, the State-approved SB4 permit. BLM may require the operator to move the proposed well more than 200 meters, modify, or delay the well completion activity in order to minimize the potential for adverse impacts to water resources.

Exception: The authorized officer may grant an exception to this stipulation if the operator demonstrates that there are no water resources with the potential to be impacted by WST activities on the well under consideration.

Modification: The authorized officer may modify this stipulation if the operator demonstrates that the well under consideration will not be subject to WST activities despite the filing of an application in the target reservoir. If the total surface disturbance is increased beyond that analyzed for the project proposed, the operator will submit a Sundry Notice to define its proposal for activities that require additional surface disturbance.

Waiver: The authorized officer may grant a waiver to this stipulation if the operator demonstrates that there are no water resources with the potential to be impacted by WST activities on any portion of the lease.

Objective: To analyze the potential for WST activities to impact water resources on public lands and to minimize the likelihood of such impacts.

Application: The CSU-Well Stimulation Technologies stipulation would be applied to reservoirs that have previously undergone WST or the geologic setting indicates a probability that WST will be required for extraction. The parcels and number of acres affected would be determined at the leasing stage.

Review Process: Generally the following process would be used to approve surface-disturbing activities with the CSU-Well Stimulation Technologies stipulation. The proposed activity would be reviewed to determine if it within a reservoir that has previously undergone WST or if the geologic setting indicates a probability that WST will be required for extraction. If the review indicates that WST will likely be required for extraction, then surface disturbing activities would be prohibited until the BLM receives sufficient information on proposed or anticipated site-specific WST activities and an associated plan to monitor and mitigate for impacts to ground water and surface water resources.

Appendix D

Best Management Practices/ Standard Operating Procedures

Appendix D.
Best Management Practices/Standard Operating Procedures

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1.1 Introduction

Best Management Practices (BMPs) are those land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to provide the most effective, environmentally sound, and economically feasible means of managing an activity and mitigating its impacts. Interdisciplinary site-specific analysis is necessary to determine which management practices would be necessary to meet specific goals. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing or surface disturbing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 Code of Federal Regulation 130.2(m), Environmental Protection Agency Water Quality Standards Regulation) or to prevent unnecessary or undue degradation of public land resources.

BMPs are identified as part of the National Environmental Policy Act process, with interdisciplinary involvement. Because the control of nonpoint sources of pollution and prevention of damage to other resources is an ongoing process, continual refinement of BMP design is necessary. This process can be described in five steps, which are: (1) selection of design of a specific BMP; (2) application of BMP; (3) monitoring; (4) evaluation; and (5) feedback. Data gathered through monitoring is evaluated and used to identify changes needed in BMP design, application, or in the monitoring program.

BMPs described in this appendix are a compilation of existing policies and guidelines and commonly-employed practices designed to assist in achieving the objectives for maintaining or minimizing water quality degradation from nonpoint sources, loss of soil productivity, providing guidelines for aesthetic conditions within watersheds, and mitigating impacts to soil, vegetation, or wildlife habitat from surface disturbing activities. BMPs are selected and implemented as necessary, based on site-specific conditions, to meet a variety of resource objectives for specific management actions. Therefore, this document does not provide an exhaustive list of BMPs, as additional BMPs or modifications may be identified to minimize the potential for negative impacts when evaluating site-specific management actions through an interdisciplinary process.

In addition, implementation and effectiveness of BMPs need to be monitored to determine whether the practices are achieving resource objectives and accomplishing desired goals. Adjustments will be made as necessary.

Each of the following BMPs are a part of the coordinated development of this Resource Management Plan and may be updated as new information becomes available to ensure objectives are met and to conform to changes in BLM regulations, policy, direction, or new scientific information. Applicants also may suggest alternate procedures that could accomplish the same result.

1.2 General

These measures will be applied to all BLM undertakings and authorizations:

- No construction or surface disturbing activities shall occur without prior written authorization of the authorized BLM officer.
- Surface disturbance will be minimized. Project applicants will be encouraged to utilize previously disturbed sites when feasible.

- Authorizations for new surface-disturbing activities will place priority on avoiding impacts to biological, cultural, and paleontological resources. Avoidance will employ measures such as relocation of project sites, modifying construction techniques, and altering project timing.
- Civil engineering studies or geotechnical studies may be required to determine feasibility prior to road or other construction. Construction in areas of extremely unstable bedrock formations and active landslides will not be permitted or would require special design criteria.
- Delineate work area boundaries with flagging, temporary fencing, or other marking to minimize surface disturbance or impacts on sensitive biological, cultural, paleontological, or other important resources.
- When necessary to protect sensitive biological, cultural, paleontological, or other important resources, monitoring by BLM approved biologists, archaeologists, and paleontologists shall be required during construction activities.
- Avoid soil-disturbing activities during periods of high rainfall and runoff or when soils are wet and muddy, in order to minimize impacts to biological, archeological, and paleontological resources.

1.3 Air Quality

1.3.1 Roads

- Vehicle speed limits may be applied to reduce fugitive dust emissions from road use.
- Watering, graveling, paving, or the application of surfactant may be used to reduce fugitive dust from road use.

1.3.2 Oil and Gas Production

- Projects and activities on BLM lands shall meet applicable Federal, State, Regional Air Quality Control Boards, and other local emissions standards for air quality.
- Operators will be encouraged to directionally drill multiple wells from a single pad to minimize roads, travel, dust, and vehicle emissions.
- Plan road systems to increase efficiency, reduce surface disturbance, which contributes to fugitive dust emissions, and save in construction and maintenance costs.
- Apply water along unpaved access roads and during trenching and earth-moving construction activities.
- Install vapor recovery units to reduce VOC emissions, which contribute to ozone formation.
- Reduce emissions from leaking gas on reciprocating compressor rod packing systems by replacing compressor packing rods at frequent intervals.
- Use solar power at tank setting or facility locations to reduce the number of vehicle trips and methane emissions from the use of pneumatic pumps.
- Replace high-bleed devices with low-bleed devices or retrofit bleed reduction kits on high-bleed devices. This reduces methane and VOCs from pneumatic devices (liquid level controllers, pressure regulators, and valve controllers).

- Use "green completions" to recover product, while reducing methane and VOC emissions that would otherwise result from venting or flaring during well completions.
- Vanpool to reduce the number of vehicles and associated combustion emissions.
- Use enclosed tanks instead of open pits to reduce fugitive VOC emissions.
- Use vapor recovery units on oil, condensate, and produced water storage tanks to reduce fugitive VOCs and recover BTU-rich vapors for sale or use on-site.
- Consider a BLM-approved dust suppressant to control fugitive dust emissions.
- Use cleaner diesel engine power (shift from Tier 1 to Tier 4) as manufacturers phase in newer engines between 2011 and 2014.
- To reduce NOx, SOx, CO, and CO2, use controls for compressor engines, including closed loop engine control, controlled engines, selective catalytic reduction, system-installed power supply (solar or battery powered), and ultra-low sulfur diesel.
- Complete interim reclamation (post-drilling) and final reclamation of well sites and roadways during abandonment; recontour and revegetate unused or unnecessary areas to reduce fugitive dust emissions from bare or eroded soils and combustion emissions from vehicle travel.
- Reduce emissions that result from glycol over-circulation in glycol dehydrators by optimizing the circulation rate.
- Reduce GHG emissions (CH4) by installing and using a flash tank separator to capture and recycle methane that flashes from rich glycol in an energy exchange pump.
- Reduce centrifugal wet seal compressor emissions from the seal oil degassing vent by replacing of wet seals with dry seals, which emit less methane and have lower power requirements.
- Install plunger lifts and smart automation systems, which monitor well production parameters to reduce methane emissions from well blowdowns.
- Reduce fugitive gas leaks by implementing a Directed Inspection and Maintenance program, which identifies and cost effectively fixes fugitive gas leaks using leak detection (infrared camera, organic vapor analyzer, soap solution, ultrasonic leak detectors) and measurement (calibrated bagging, rotameters, high volume samplers).

1.3.3 Additional Information on BMPs for Air Quality

- BLM Washington Office BMP Web site: http://www.blm.gov/bmp
- EPA Natural Gas STAR Program: http://www.epa.gov/gasstar/tools/recommended.html
- California Air Resources Board Clearinghouse: http://www.arb.ca.gov/cc/non-co2-clearinghouse/non-co2-clearinghouse.htm
- Four Corners Air Quality Group: http://www.nmev.state.nm.us.aqb/4C/
- Intermountain BMP Web Site/Database: http://www.oilandgasbmps.org
- Fugitive Dust Control: http://www.arb.ca.gov/cap/handbooks/fugitivedust_large.pdf
- Forest Management Burning Handbook: http://www.arb.ca.gov/cap/handbooks/forestmngtburnlg.pdf

- Oil Field Production Handbook: http://www.arb.ca.gov/cap/handbooks/oilfieldproductionlarge.pdf
- Naturally Occurring Asbestos Control: http://www.arb.ca.gov/cap/handbooks/asbestosnoafinal.pdf

1.4 Biological Resources

The following measures are Standard Operating Procedures (SOP) typically applied to BLM undertakings or authorizations that are implemented to avoid or mitigate impacts to biological resources.

1.4.1 Biological Resource Protection

- No destruction, cutting, or clearing of trees or other vegetation shall occur without prior written approval from the authorized BLM officer.
- Biological surveys will be required prior to any disturbance, unless given project- specific, written clearance from BLM officers.
- Surveys will be conducted at the appropriate time of year to detect sensitive species and important biological resources.
- Surveys will comply with current BLM, USFWS, NMFS and CDFW protocols, to the extent consistent with federal law.
- If it has been longer than 30 days between the last biological survey and the proposed start of construction, BLM biologists may require additional surveys for sensitive species.
- All biological survey data and reports will be sent from the biologist conducting the survey directly to the BLM biology staff. All survey biologists are required to have an updated CV on file in the Central Coast Field Office. Prior to undertaking a survey, BLM will certify that survey biologists have appropriate training, experience, and permits.
- Exploration, construction, and development activities may have seasonal restrictions imposed within a half- mile radius around raptor nest sites. Seasonal restrictions would allow for undisturbed courtship, nest building, incubation and fledging. This seasonal restriction could last as long as six months, depending upon species. Restrictions could be imposed around high-use areas during other seasons.
- Facilities and structures such as power lines, wind towers and turbines, solar arrays, and communication facilities will conform to BLM-, USFWS- and CDFW-approved wildlife protection guidelines, to the extent consistent with federal law. Such guidelines include, flight diverters, night ambient lighting, tower beacon lights, wind tower design and avoidance measures, raptor protections for power poles, perimeter fencing, and vegetation management.
- Trenches and holes shall be provided with animal escape ramps and not be open longer than one week.
- Pipe ends two inches or greater will be covered.
- Power lines will be constructed to meet raptor protection protocols. Existing power lines will be modified to meet raptor protection protocols where electrocutions occur.

- All troughs shall have an escape ramp. Ensure that troughs allow wildlife access to water and that they are in good repair and function properly.
- Claim stakes made of pipe shall be two inches or less in diameter with sealed tops.
- Vehicles will remain on existing legal roads unless given specific written approval by the authorized BLM officer. Off-road travel will be discouraged.
- In appropriate sites, constraints will be placed on vehicle speeds to reduce potential for roadkill, to minimize dust, and to protect sensitive animals and habitats.

1.4.2 Wetland-Riparian Habitats

- Stream crossings, if necessary, would be designed to minimize adverse impacts to soils, water quality, and riparian vegetation and provide for fish passage as appropriate.

1.4.3 Rehabilitation/ Restoration

- Disturbed sites will be restored to natural conditions using site-appropriate measures and timelines developed in consultation/coordination with BLM resource specialists. Restoration plans and requirements will be developed on a case-by-case basis and include post-project monitoring.
- All unnecessary roads, vehicle paths, and other disturbed areas will be restored to natural conditions.
- Match local genotypes, as close as practical, when choosing seeds and other plant materials for habitat restoration.

1.4.4 Threatened and Endangered, and Sensitive Species

Many measures to protect threatened and endangered species have been developed as a result of formal consultations between the BLM and USFWS on a variety of BLM actions. BLM has also developed best management practices, standard operating procedures, and conservation measures and design criteria to mitigate specific threats to sensitive species. As additional measures are developed to minimize the adverse effects from future management activities, they are likely to become additional SOPs.

Special status species survey, avoidance, take minimization, mitigation measures, compensation, and monitoring measures required in biological opinions (programmatic and site-specific) will be incorporated into project design, attached as conditions of approval, grant, or lease terms and conditions, or otherwise implemented in all BLM projects and authorizations that may affect listed species. These measures may change due to new information new biological requirements. Current practices are found below.

General Guidelines for Conserving Habitat and Minimizing Project Impacts

- Habitat disturbance will be minimized and conducted in a manner that reduces, as much as possible, the potential for take of individuals of a listed species. Existing roads and routes of travel will be used, to the greatest extent practicable. Natural drainage patterns will be maintained to the greatest extent practicable.

- Avoid large draws and drainages with saltbush to the greatest extent practicable.
- The area of disturbance will be reduced to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors.
- Work area boundaries will be delineated with flagging, temporary fencing or other marking to minimize surface disturbance associated with vehicle straying.
- To the extent practicable, use previously disturbed areas to stockpile excavated materials, store equipment, dig slurry and borrow pits, locate trailers, park vehicles, and performing other surface-disturbing actions.
- All oil spills will be contained closest to the source site as possible. The USFWS will be notified within 48 hours of any oil spill. The NMFS will be notified within 48 hours if there is potential to impact coastal areas or waters, or steelhead habitats.
- Project employees will be directed to exercise caution when commuting within listed species habitats. The speed limit on unpaved roads not maintained by the county shall be a maximum of 20 MPH, in order to minimize wildlife casualties.
- Cross-country travel by vehicles is prohibited, unless specifically authorized by BLM for the project. The use of all-terrain vehicles (ATVs) may be considered for projects that require cross-country travel (such as project survey staking, geophone placement and retrieval).
- Project employees will be provided with written guidance governing vehicle use restrictions, speed limits on unpaved roads, and fire prevention and hazards.
- A worker education program will be conducted for all employees working on the project sites in listed species habitats. The education program will include identification of listed species and their habitats, project mitigation measures and stipulations, reporting requirements, and penalties for failure of compliance.
- Take measures to prevent the diffuse or point discharge of potential biological toxicants onto the ground surface.
- All spills of hazardous materials within endangered species habitats shall be cleaned up immediately. The NMFS will be notified within 48 hours of hazardous materials spills in known or potential black abalone habitat.
- Unless specified for reducing impacts to blunt-nosed leopard lizards, actions during evening hours when some listed species are active and vulnerable to vehicle or equipment-induced injury or mortality will be minimized.
- Trash and food items will be contained in closed containers and removed daily.
- Firearms will be prohibited from project sites.
- Trenches or holes should have at least one escape ramp for each 1,000 feet of open trench. Escape ramps should be earthen and at a slope no steeper than 1:1. Trenches will be checked in the morning before beginning work and at the end of the work day. Any entrapped animals will be allowed to escape unharmed.
- Pets will not be permitted on construction project sites.
- Listed species shall be protected from the hazards posed by oil sumps. All hazardous exposed oil sumps shall be screened or eliminated (see California Laws for Conservation of Oil and Gas

1995). All screening of sumps shall meet the following specifications: (1) be not greater than 2 inch nominal mesh, (2) be of sufficient strength to restrain entry of wildlife, and (3) be supported in such a manner so as to prevent contact with the sump fluid. Oil sumps shall be designed, constructed, and maintained as to not be a hazard to people, livestock, or wildlife, including birdlife. Oil sumps shall be filled with earth after removal of harmful materials (see California Code of Regulations 1982).

- Biologists and law enforcement personnel from the CDFW and the USFWS shall be given complete access to the project area to review monitoring and mitigation activities.
- Project activities that are likely to cause the amount or extent of take to be exceeded shall cease immediately.
- The protective measures being implemented for listed species shall be extended to candidate and proposed species in the project area to the maximum extent practicable.
- Restoration will be required on unused portions of the project area, or oil and gas lease when deemed necessary by the BLM to maintain or improve habitat values. Restoration will be required when a project or lease is abandoned. The BLM will be contacted for specific restoration requirements upon project completion.

Survey Requirements

- Biological surveys will determine listed species presence and/or important habitat features for listed species. Surveys will be conducted within 30 days prior to the onset of ground breaking actions and will include daytime line transect surveys which will be conducted by walking the project area and appropriate buffer at 30 to 90 feet intervals. Transect width will be adjusted based on vegetation height, topography, etc. Surveys will include areas of surface disturbance, appropriate buffers, access routes, and cross-country travel routes. Surveys will be designed to identify habitat features such as burrows, dens, and precincts, and not species presence or absence. Plant surveys must be conducted during the peak flowering interval of the San Joaquin Valley (~late February – early April) in a year when there has been sufficient rainfall to initiate germination of annual plants AND to sustain growth (rule of thumb: the grassland across the broad landscape should appear uniformly green) to flowering for positive identification. Sensitive plant surveys conducted outside of the peak flowering interval and/or in an inadequate rainfall year may result in delay of project approval (until the next adequate rainfall year). **Project proponents are strongly encouraged to consider conducting sensitive plant surveys well in advance (2 – 5 years) of their project start date to take advantage of infrequent adequate rain years. The average adequate rainfall year frequency in the San Joaquin Valley for annual plant germination and growth is only about once every three years, and the peak flowering interval to identify any listed plant species is typically three weeks or less.**

- If non-BLM lands are also involved in a project, an applicant may choose to comply with some other USFWS- and CDFW-approved program (such as a Habitat Conservation Plan). If an

alternative program were selected, the survey requirements for the alternative program may be substituted at the USFWS's and BLM's discretion.

San Joaquin Kit Fox – Survey for natal, known, occupied, and potential dens in the project area and a 200-foot buffer.

Blunt-Nosed Leopard Lizard – Survey for burrows that may be used by blunt-nosed leopard lizards in the area to be disturbed by the project and a 50-foot buffer.

Giant Kangaroo Rat – Survey for precincts in the area to be disturbed by the project and a 50-foot buffer.

Federal Proposed and Federal Candidate and State Listed Animal Species – Survey for important habitat features in the area to be disturbed by the project and a 50-foot buffer.

California jewelflower, and San Joaquin woolly threads – Survey during the peak flowering season (~late February – early April) during an adequate rainfall year (the grassland landscape should appear uniformly green) in the area to be disturbed by the project plus a 50-foot buffer. Conduct reconnaissance-level surveys to determine habitat suitability using meandering walk-over surveys. Conduct site-specific surveys in appropriate habitat by walking transects with 50-foot spacing.

At the discretion of an approved BLM botanist, existing information may be used to conclude that the site is not occupied and surveys are not required or that project impacts are acceptable without detailed surveys.

Hoover's woolly-star – Survey for species in the area to be disturbed by the project and a 50-foot buffer, if season is appropriate. If season is inappropriate to detect species or skeletons, use surveys to evaluate potential of a site to support the species. Reconnaissance level surveys to determine habitat suitability will be conducted using meandering walk-over surveys. Site-specific surveys in appropriate habitat will be conducted by walking transects at 50-foot intervals.

At the discretion of an approved BLM botanist, existing information may be used to conclude that the site is not occupied and surveys are not required or that project impacts are acceptable without detailed surveys.

State-Listed and Federally Proposed and Candidate Plant Species – Survey in the area to be disturbed by the project and a 50-foot buffer, if season is appropriate. If extant populations or high potential habitat is known to occur in the project area, the BLM may require surveys during the appropriate season. At the USFWS/BLM's discretion, existing information may be used to conclude that the site is not occupied and surveys are not required.

Measures for Minimizing Take

San Joaquin Kit Fox

San Joaquin kit fox dens will be protected, to the maximum extent practicable. Known, occupied, and potential non-natal dens will be buffered by 100 feet. Unoccupied natal dens will

be buffered by 200 feet to protect the physical den site. If an active natal den is encountered, the USFWS will be contacted immediately, before any action is taken.

The project construction area will be delineated with a temporary fence, flagging, or other barrier. Actions within the buffer zone shall be limited to vehicle and equipment operation on existing roads.

Non-fatal disturbance, such as above ground blasting, vibroseis, and shothole, shall not occur within 500 feet of an active San Joaquin kit fox natal den between November 1 and August 15 to reduce disruption of kit fox breeding.

Potential dens will be monitored and temporarily blocked. Den monitoring will follow the guidelines described below. In the event that a den is encountered that needs to be excavated, the following will apply:

Non-natal dens within a construction area may be carefully excavated at any time of the year by USFWS-approved biologists or under the supervision of a USFWS-approved biologist. Prior to the destruction of the den, the den will be monitored for at least three consecutive days to determine its current status. Activity at the den will be monitored by placing tracking medium at the entrance and by spotlighting. If no kit fox activity is observed during this period, the den will be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den will be monitored for at least five consecutive days from the time of observation to allow any resident animal to move to another den during its normal activities. Use of the den can be discouraged during this period by partially plugging the entrance(s) with soil in such a manner that any resident animal can escape easily. Destruction of the den may begin when, in the judgment of the USFWS-approved biologist, the animal has moved to a different den. If the animal is still present after five or more consecutive days of plugging and monitoring, the project biologist shall contact the BLM or the USFWS to obtain permission to excavate the den when it is temporarily vacant, for example, during the animal's normal foraging activities.

Destruction of the den will be accomplished by careful excavation until it is certain that no kit foxes are inside. The den will be fully excavated and then filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If, at any point during excavation a kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring of the den will be resumed. The BLM and the USFWS will be notified immediately. Destruction of the den may be resumed, when in the judgment of the USFWS-approved biologist, the animal has escaped from the partially destroyed den.

If an unoccupied natal den cannot be avoided, the den will be carefully excavated by a USFWS-approved biologist with permission from the USFWS or the BLM. Excavation of unoccupied natal dens will be allowed only between August 15 and November 1.

Pipes and culverts will be searched for kit fox prior to being moved or sealed, to ensure that kit foxes are not being entrapped. Any kit fox found will be allowed to escape unimpeded. Pipes and culverts with a diameter greater than 4 inches will be capped or taped closed after searching them.

Occupied pipe dens will be protected to the maximum extent practicable. Pipe dens will be buffered to protect the physical den site and kit fox activity. Removal of pipe dens will follow the monitoring and plugging procedure described above for natural dens.

Blunt-Nosed Leopard Lizard

If a blunt-nosed leopard lizard is observed in the project area or along the access route BLM will be immediately contacted. BLM will provide additional measures that must be complied with to avoid impacts to blunt-nosed leopard lizards.

Avoid burrows that may be used by blunt-nosed leopard lizards, to the greatest extent practicable.

The biological monitor shall check the project area and access route daily during the blunt-nosed leopard lizard active season to determine the presence or absence of lizards in the work area. If blunt-nosed leopard lizards are observed in the project area or along the access route BLM will be immediately contacted. BLM will provide additional measures that must be complied with to avoid impacts to blunt-nosed leopard lizards. As part of the post-construction report, a map showing the location, date, and time of the observation will be submitted.

If blunt-nosed leopard lizards are known or likely to occur in the general project area:

Avoid burrows that may be used by blunt-nosed leopard lizards.

Locations of activities with potential to collapse or block burrows (sleeper placement, stockpile, storage and parking areas, trenching) will be approved by the biological monitor.

The biological monitor may allow certain activities in burrow areas if, in his or her judgment, the combination of soil hardness and activity impact is not expected to collapse burrows. Activities authorized by the biological monitor in burrow areas will be documented and included in any report.

Roadway sections where blunt-nosed leopard lizards have been observed or are likely to occur should be clearly marked to prevent workers from driving off the road and over burrows. Barriers, such as fencing, may also be installed.

A brief description of measures taken to avoid burrow collapse will be included in any report, including the post-construction report.

In addition, for project activities that occur during the blunt-nosed leopard lizard active season (approximately April 15 to October 15) the following will apply:

- Notify the BLM that blunt-nosed leopard lizard active season measures are being implemented;
- When possible, conduct project activities at night or during blunt-nosed leopard lizard inactivity periods (generally when temperatures are below 77 degrees F and above 99 degrees F);

- All personnel will be advised to reduce speeds on sections of the access/egress route with potential to support blunt-nosed leopard lizards.
- All vehicle operators will check under vehicles and equipment prior to operation.
- Any trenches or pits will be inspected by the biological monitor in the morning, late afternoon, at the end of the work day and prior to backfilling to free any blunt-nosed leopard lizards that may become entrapped. Trenches or holes should have at least one escape ramp for each 1,000 feet of open trench. Escape ramps should be earthen and at a slope no steeper than 1:1.

A flashing barrier may be installed around the work area to prevent blunt-nosed leopard lizards from entering the work area. The flashing barrier will be constructed of 18-inch or wider flashing, buried 6-inches in depth and reinforced with rebar or fence posts. Silt fencing will be used to isolate areas inside the exclusion fence. If a blunt-nosed leopard lizard is subsequently found within the fenced area, the fence will be removed (in that area) and the lizard will be allowed to leave the exclusion zone. Surveys will continue until blunt-nosed leopard lizards are no longer observed inside the flashing barrier (i.e. no evidence for one to two weeks dependent upon the discretion of the biologist). Barrier installation should occur prior to emergence of blunt-nosed leopard lizards or by April 15. Locate flashing so that no burrows are destroyed and avoid burrows during barrier construction. Surveys will occur when temperatures are sufficient for leopard lizards to be above ground. The flashing barrier will remain in place until drilling and sump closure activities have been completed.

Burrows that cannot be avoided may be destroyed under the following circumstances:

- Burrows inside a barrier may be destroyed after the survey and monitoring requirements described above for flashing barriers has been met. Burrows should be carefully excavated under the supervision of a qualified biologist to verify that is it unoccupied and then destroyed.
- If any burrows are destroyed, the following information will be included in the post construction compliance report: the dimensions of the of the area impacted by burrow destruction/excavation; number of burrows destroyed/excavated; results of burrow excavation, including any observations of wildlife in excavated burrows; and any other information deemed useful by the consulting biologist.
- If a blunt-nosed leopard lizard were observed exiting a burrow, the burrow should be carefully excavated, under the supervision of a qualified biologist to verify that is it unoccupied and immediately destroyed.

The biological monitor shall check the project area and access route daily during the blunt-nosed leopard lizard active season to determine the presence or absence of lizards in the work area. If blunt-nosed leopard lizards are observed in the project area or along the access route, the biological monitor will take action to avoid impacts on lizards.

If a blunt-nosed leopard lizard is observed at the project site or along the access/egress route, the biological monitor will notify the BLM of the actions being undertaken. Initial notification may be by phone message. Written documentation, including GPS coordinates of lizard

observations, will be included in any reports. The post-construction report will include a map showing the location, date, and time of any blunt-nosed leopard lizard observations.

Roadway sections where blunt-nosed leopard lizards have been observed should be clearly marked to prevent workers from driving off the road into blunt-nosed leopard lizard habitat or over burrows. Barriers, such as fencing, may also be installed.

The biological monitor must be on-site during appropriate temperatures for blunt-nosed leopard lizard activity. The biological monitor will escort all traffic through any area where blunt-nosed leopard lizards have been observed. Biological monitors will complete daily compliance reports, which will be summarized and included in the weekly report sent to the BLM.

Large vehicles (tankers, water trucks, drilling rigs) must be escorted to and from the worksite by a biological monitor during appropriate temperatures for blunt-nosed leopard lizard activity.

The biological monitor will provide the BLM with a brief weekly report describing any actions taken to avoid blunt-nosed leopard lizard impacts. This report may be submitted by e-mail to the BLM.

All reports must be submitted by the biological monitor conducting the work in the field or be reviewed by the field biological monitor. Alternately, the original report prepared by the field biological monitor may be attached to the report.

When the biological monitor determines that temperature patterns at the project site no longer support blunt-nosed leopard lizard activity for the season and with receipt of the BLM's concurrence, these active season measures may be discontinued.

If blunt-nosed leopard lizards have been observed in the project area or along the access route, and operations and maintenance will continue into the next blunt-nosed leopard lizard active season, an operations and maintenance plan (O&M Plan) will be submitted to BLM. The O&M Plan will outline the practices and mitigation measures that will be implemented to avoid impacts on blunt-nosed leopard lizards.

Giant Kangaroo Rat

Avoid active precincts by a buffer of 50 feet. Actions within the buffer zone will be limited to vehicle and equipment operation on existing roads. Actions within buffer zones will be confined to daylight hours.

Annually, the USFWS will advise the BLM if applicants should be required to implement the following capture and release program:

- If active precincts cannot be avoided, the area will be trapped no greater than seven days before ground-disturbing activities for five consecutive nights. On the day following the fifth trap night, burrows will be carefully excavated. Captured animals will be marked and may be released into enclosed artificial burrow systems outside the work area the following night. All work will be supervised by a USFWS-qualified biologist. At any time

during the year, the USFWS and the BLM may adjust or decide to discontinue the capture and release program.

California jewelflower, San Joaquin woolly-threads and Hoover's woolly-star

Extant populations will be avoided, to the greatest extent practicable. The locations of listed plants will be avoided and temporarily fenced or prominently flagged to prevent inadvertent encroachment by vehicles and equipment during the activity.

The following guidelines shall be used to determine thresholds for facilities operation and maintenance activities that are within the scope of certain programmatic biological opinions:

- Herbicide use will not be permitted within 300 feet of listed plant populations identified during pre-project surveys.

San Joaquin Antelope Squirrel

To the maximum extent practicable, the measures described above for blunt-nosed leopard lizards will be applied to San Joaquin antelope squirrel in the project area and along the access/egress route.

In areas where antelope squirrels are suspected to occur and when temperatures are suitable for antelope squirrel activity, all personnel will be advised to check below parked vehicles and equipment before moving such vehicles or equipment. Caution will be taken when driving through areas where antelope squirrels may occur.

The applicant should refer to CDFW and CDFW-approved San Joaquin antelope squirrel take avoidance measures to minimize or eliminate the likelihood "take" of San Joaquin antelope squirrel in order to comply with the California Endangered Species Act.

California Condor

The following measures have been developed by BLM and USFWS and applied to past oil and gas projects near condor roosting and nesting areas.

- Drilling and well completion activities may be restricted to certain time periods to reduce impacts to condors. The specific dates may be modified to reflect actual conditions for a given year. The general time periods may be modified should the USFWS recommend a different time period.
- Operators will designate a representative (Designated Representative) who will be responsible for overseeing compliance with the California Condor Protection Measures. The operator will provide BLM with the name, phone number, and email of the Designated Representative. The operator will promptly notify BLM of any changes to the Designated Representative.
- Prior to conducting work on-site, employees and contractors shall be made aware of the protected species, and how to avoid and minimize impacts to them. Special emphasis will be placed on keeping the well pad site free of "microtrash" and other hazards.

- Direct contact with California condors shall be avoided.
- All work areas shall be kept free of trash and debris. Particular attention shall be paid to "microtrash." All construction debris and trash (including such small items as screws, nuts, washers, nails, coins, rags, small electrical components, small pieces of plastic, glass or wire, and any debris or trash that is colorful or shiny) shall be covered, kept in closed containers, or otherwise removed from the project site at the end of each day or prior to periods when workers are not present at the site.
- All food items and associated trash shall be placed in covered containers. This would include small bits of trash and debris, such as soda can pull tabs, electrical connectors, broken glass, and pieces of rubber, plastic and metal.
- All equipment and work-related materials (including loose-wires, open containers or other supplies or materials) shall be contained in closed containers either in the work area or placed inside vehicles. Loose items (e.g., rags, hose, etc.) shall be stored within closed containers or enclosed in vehicles.
- All hoses or cords that must be placed on the ground due to drilling operations that are outside of the primary work area (immediate vicinity of the drilling rig) shall be covered to prevent California condor access. Covering may take the form of burying or covering with heavy mats, planks, or grating that would preclude access by California condors.
- All liquids shall be in closed, covered containers. Any spills of hydrocarbon/hazardous liquids shall not be left unattended until clean-up has been completed. No open drilling mud, water, oil or other liquid storage or retention structures will be allowed. All such structures will be required to have some sort of netting or other covering that precludes entry or other use by condors or other listed avian species.
- Where practical, ethylene glycol based anti-freeze or other ethylene glycol based liquid substances will be avoided, and propylene glycol based antifreeze will be encouraged. Equipment or vehicles that use ethylene glycol based anti-freeze or other ethylene glycol based liquid substances shall be inspected daily for leaks. While at the site, areas below vehicles and equipment using ethylene glycol based substances will be checked for leaks and puddles. Standing fluid (i.e., a puddle of anti-freeze) shall be remediated (e.g., cleaned-up, absorbed, or covered) without unnecessary delay. Vehicles using ethylene glycol based substances will be inspected before and after field use for obvious leaks and puddles. Leaks will be repaired before the vehicle is allowed back into the general area. No changing of antifreeze of any type will be allowed within the oil and gas development area.
- A not-to-exceed 20 MPH speed limit shall be implemented and enforced during all activities.
- All construction equipment, staging areas, materials, and personnel shall be restricted to disturbed areas that are not habitat for listed species.
- To prevent injury to wildlife, habitat degradation, erosion, and fires, driving off of disturbed areas without a pre-activity survey and implementation of appropriate measures is prohibited, except in the case of an emergency.

- Firearms and pets are prohibited.
- No feeding of wildlife shall be permitted.
- The potential for human-caused wildfires should be minimized by use of shields, mats, or other fire-prevention methods when grinding or welding. Fire watch, including water, extinguishers, and shovels shall be available for fire suppression.
- Approval from the FWS will be obtained prior to 1) the use of any aircraft in the drilling, operation, or monitoring of the wells, and 2) flaring of natural gas or other flammable gases or substances at the project site.
- Any use (perching, landing) of a well site and its associated facilities by California condors shall be recorded and reported to the operator's Designated Representative and BLM.
- Any take (harm, harassment, injury, killing, etc., or any attempt to engage in these activities) shall be reported to the operator's Designated Representative. The Designated Representative shall immediately notify BLM and USFWS as appropriate. The activity that caused the take to occur shall be ceased immediately.
- Should a well prove productive, the following additional measures will be implemented:
  - Barriers (such as welded wire fabric or hardware cloth) will be installed around well cellars and on secondary containment pans to prevent condor access.
  - Stainless steel lines, rather than poly chemical lines will be used to preclude condors from obtaining and ingesting pieces of poly lines.
  - Landing deterrents, such as Daddi Long Legs or porcupine wire, will be attached to the walking beams on pumping units.
  - Should condors continue to make use of the ground near the proposed pad, perimeter fence will be installed to discourage condor access.
  - Information signs regarding micro-trash will be posted.
  - Power lines will not span canyons or be located on ridgelines. The distance between power lines will be sufficient to prevent electrocution of condors and other raptors. Bird deflectors will be installed.

Steelhead

The following measures have been developed by BLM and NMFS to be applied to all oil and gas operations occurring in or near areas used by steelhead or containing their critical habitat. NMFS will be consulted on all projects occurring in or near steelhead critical habitat prior to project authorization.

- Operators will designate a third party biological monitor who will be responsible for overseeing compliance with the Steelhead Protection Measures. The operator will provide BLM with the name, phone number, email, and resume of the third party salmonid biological monitor for BLM approval. The biologist must be knowledgeable on salmonid life history and ecology, and have experience monitoring impacts to salmonids. The operator will promptly notify BLM of changes to the third party biological monitor.
- The third party biologist is responsible for providing a pre-project environmental education training to all personnel working in the project area focusing on steelhead and

their critical habitat. The biological monitor will be onsite during the construction process and available throughout the entire project.

  - The pre-project education training will include a pamphlet that shall be distributed to all project personnel entering the work area. The educational program will be site specific and include steelhead illustrations, habitat (habitat illustrations; spawning beds), extent of critical habitat, and what to do if the species is observed. This pamphlet must be approved by BLM.

- Drilling, well completion, work-overs, and abandonment activities may be restricted to certain time periods to reduce impacts to steelhead (i.e.: vehicle & equipment traffic, vibrations/noise/light pollution due to drilling, spills, etc.). Drilling and well completion work will be restricted to the period from between June 1st to November 30th. The specific dates restricting construction activities may be modified to reflect a given year (i.e.: wet years with higher flows later in the season). In addition, the time periods may also be modified should NMFS recommend a different time period.
- A spill prevention plan must be submitted to BLM prior to project approval for new wells, well completion or work-overs, installation of new facilities (buildings, tanks, pipelines, production equipment, etc.), routine maintenance activities and well abandonments. The prevention plan must identify a Spill Response Team, comprised of state and federal emergency response agencies and provides contact numbers for each representative or representative agency.
  - The Incident Commander will be identified and designated promptly after spill notification. The Incident Commander is responsible for coordinating with all federal, state, and local agencies throughout the spill clean-up.
  - The Incident Commander must be a representative of a state or federal agency. The Designated Representative will promptly notify BLM of changes to the Spill Response Team.
  - The spill prevention plan must also identify spill response materials, locations of materials, containment protocols, and containment/clean-up strategy.
- In the unlikely event of an oil spill within 500-ft of steelhead critical habitat BLM must be notified immediately. Any spill with potential to enter a stream within steelhead critical habitat shall require immediate response from the spill response team.
- All liquids shall be in closed, covered containers. Any spills of hydrocarbons/hazardous liquids shall not be left unattended until clean-up has been completed. No earthen sumps or pits will be allowed for drilling, completion, workover, or abandonment activities. No open drilling mud, water, oil, or other liquid storage (such as acids, KCL solution, or other chemical solutions for well drilling and completions activities) or retention structures will be allowed. Secondary containment will be required around all liquid storage containers and have a plastic membrane/liner to prevent leaks from leaving the secondary containment.
- For projects that require earthen stream crossings for site access, all stream crossings must be identified and an estimate of use (types of vehicles, number of trips, etc.) during the lifetime of the entire project prior to project approval. Prior to start of any drilling or well-completion projects where site access has earthen stream crossing with water present, the third party salmonid biologist is required to survey for the presence of active redds or juvenile salmonids. No work may proceed if active redds or juvenile salmonids are observed.

- Temporary structures (steel plates, concrete bridges, wooden platforms, etc.) may be required to span stream crossings in areas to protect waterways with steelhead presence and/or spawning gravels were practical. These temporary structures would allow vehicles and equipment to cross streams without impacts to salmonid critical habitat.
- No new construction where the nearest edge of disturbance is below the 100 year flood line within steelhead critical habitat.
- Existing pad locations within steelhead critical habitat may be used as long as certain criteria are met
    - The surface of the pad location is above the 100 year flood line, and
    - Any portions of the pad below the 100 year flood line have established vegetation on both cut and fill slopes, and no apparent signs of erosion.
- Containment berms will be constructed on the perimeter of all new pad locations and new authorizations to ensure no materials or liquids (such as hydrocarbons or hazardous liquids) with the potential for contamination of streams (leaks, spills, contaminated rainwater, etc.) leave the pad location and enter steelhead critical habitat or a tributary with potential to enter steelhead critical habitat.
- Work areas will be kept free of trash and debris. All chemicals, spoils, equipment, and wastes will be removed from the well pad at the completion of drilling, workover, and maintenance operations and prior to November 30th.
- Any structures, chemicals, and materials with potential to discharge pollutants if the facility were inundated will not be allowed to remain on the pad location during periods of potential high flows, during the salmonid spawning run and juvenile out-migration (December 1st thru May 31st), or during unseasonably high flows.
- All new pipelines needing to cross streams within steelhead critical habitat will be suspended above the 100 year flood line.
- Spoils remaining after the completion of the well pad shall not be stored below the 100 year flood level and in a location where spoils cannot be washed into a stream, where it could cover aquatic vegetation or spawning areas.
- No materials shall be stored in seasonally dry portions of streams that could be washed downstream.
- A not-to-exceed speed limit of 20 MPH speed limit shall be implemented and enforced for all roads. A not-to-exceed speed limit of 5 MPH will be implemented and enforced for all earthen stream crossings to reduce the potential for increased sedimentation.
- All construction equipment, staging areas, materials, and personnel shall be restricted to disturbed areas, and no storage shall occur in drainages and stream channels.
- To prevent injury to wildlife, habitat degradation, erosion, and fires, driving off of disturbed areas without a pre-activity survey and implementation of appropriate measures is prohibited, except in the case of an emergency. In addition, no driving in stream channels is authorized except at existing approved road crossings.
- The potential for human-caused wildfires should be minimized to the greatest extent practicable by using shields, mats, or other fire prevention methods when grinding or welding. Fire watch including: water, extinguishers, and shovels shall be available for fire suppression.
- Firearms and pets are prohibited.
- No feeding of wildlife shall be permitted.

Project Monitoring

Each project will have a field contact representative (FCR), who will be responsible for overseeing compliance with protective stipulations for listed species. The FCR may be a project manager, project representative, BLM employee, or contract biologist. The FCR will have the authority to halt all actions that are in violation of the stipulations. The FCR will have a copy of all appropriate stipulations when surface-disturbing actions are being conducted on the site. The BLM and USFWS will be notified of the name and telephone number of the FCR prior to project construction. The NMFS will also be notified when projects involve NMFS species or habitats.

Biological monitoring will be accomplished by a USFWS-qualified biologist. The biologist will be responsible for field crews to be in compliance with protection measures, performing surveys in front of crews as needed to locate and avoid sensitive species and habitat features, and monitoring project mitigation compliance. The biological monitor will have the authority to halt all non-emergency actions should danger to a listed species arise. Work will proceed only after hazards to the listed species are removed, the individual(s) is no longer at risk, or the individual(s) has been removed by the biologist.

The BLM will be provided with the name, phone number, and e-mail of the field biological monitor prior to construction. If not already on file at the Central Coast FO, a copy of the field biological monitor's resume or curriculum vitae will be submitted to the BLM prior to the commencement of construction.

Biological monitors will be required to be on-site during initial surface-disturbing actions to minimize direct take of listed species. Subsequent to initial surface disturbing activities, biological monitors are not required to be present but must be available within 24-hour notice from the applicant, the BLM, or the USFWS in order to troubleshoot potential take situations.

Biological monitors will be required to be on-site during placement of sleepers and pipe to minimize direct take of listed species.

At the BLM/USFWS's discretion, on-site biological monitors may not be required if exclusion zones or surface disturbance areas are prominently marked with lath, flagging, or fencing, as necessary.

Biological monitors are required for kit fox den excavations.

In previously unsurveyed areas, biological monitors are required for routing cross-country travel to minimize impacts on habitat features.

Biological monitors may be required, if, on project inspection by the BLM or USFWS, noncompliance of project stipulations are observed and documented.

All reports must:

- Be signed and submitted by the biological monitor conducting work in the field, OR
- Be reviewed and signed by the biological monitor conducting work in the field, OR
- Include, as an attachment, the original report prepared and signed by the field biological monitor.

An e-mail report originating from the field biological monitor may be accepted as a signature.

Within 60 days of completion of construction, a brief post-construction compliance report will be provided to the BLM that addresses:

- Any revisions to habitat disturbance estimates;
- Any observed impacts on listed species, including take;
- A brief description of significant actions taken to comply with the provisions listed above;
- An overall evaluation of compliance with the provisions and any suggestions for changes to the provisions;
- Any information required due to the sighting of an additional species, such as a blunt-nosed leopard lizard.

Compensation

The compensation ratio for San Joaquin Valley species will be 3:1 for permanent impacts and 1.1:1 for temporary impacts except as follows:

- Within the Ciervo Panoche Natural Area the compensation ratio will be 4:1 for permanent impacts.
- The compensation ratio for vernal pool habitat will be 5:1 with a replacement element.

If a new compensation ratio becomes established for a county or species, the BLM and USFWS may decide to modify compensation ratios.

For protected lands (such as federal lands, state wildlife areas, conservation banks) a replacement component will be added to the compensation ratio.

Compensation of habitat must be in kind. Land used for compensation must be of equal value or better than the land impacted. The same species must be present and habitat must be of an equal of greater value. Lands used for compensation for project impacts on San Joaquin woolly-threads, blunt-nosed leopard lizards, and the kangaroo rats must support these species or be approved by the USFWS for these species. Lands used to compensate for impacts on a kit fox natal den must support breeding populations of kit foxes.

If compensation is required for a project involving federal land or mineral estate, ownership of compensation lands will be transferred prior to any surface disturbance to one of the following: the BLM; an entity acceptable to the BLM, USFWS, and CDFW that can effectively manage listed species and their habitats; the CDFW; or the USFWS for dedication to listed species habitat management. The USFWS will be informed before the actual transfer when land is transferred.

> As an alternative to the above standard compensation method, applicants may provide a letter agreeing to dedicate existing mitigation credits or purchase additional mitigation credits at a USFWS-approved mitigation bank to compensate for any impacts.

The final compensation acreage will be adjusted on completion of construction, based on the actual amount of acreage temporarily and permanently disturbed.

The applicant may propose to conduct construction in a manner that results in no surface disturbance. The biological monitor will document surface conditions before and after construction to verify the lack

of disturbance. The biological monitor will take before and after photographs of the construction corridor every 1,000 feet or as necessary to document the lack of disturbance. The same photo point locations and directions will be used for the before and after photos. GPS coordinates for each photo point will be provided to the BLM.

The USFWS, NMFS and CDFW protocols will be employed to conduct special status species surveys.

1.4.5 Control of Non-native Species

- Projects and activities on BLM lands will include measures to minimize the introduction and spread of weeds.
- Weed control methods will follow integrated pest management principles.
- Use of pesticides shall comply with applicable federal and state laws. BLM policy requires project-specific NEPA analysis and the issuance of a pesticide use permit before the use of pesticides. Only products on the California BLM's list of approved pesticides may be used.
- The release of nonnative animal species will be prohibited, other than those legally introduced for biological control, or those released during legal hunts as regulated by CDFW.

1.5 Soils

- Minimize soil disturbance by limiting developments to the smallest area possible and by using previously disturbed areas and existing roads to the extent practicable.
- Minimize surface disturbance and design disturbed areas on steep slopes to prevent surface water from concentrating to reduce erosion and sedimentation.
- Restrict access and suspend authorized projects during wet weather when soil resources will be detrimentally affected by rutting, compaction, and increased erosion.
- Minimize fire control lines, both handline and dozerline, to the width necessary to effectively stop fire spread. Rehabilitate lines by smoothing out berms and installing waterbars prior to the rainy season.
- Assess the need for soil stabilization following wildfires. Use the Emergency Stabilization and Rehabilitation process to determine and implement needed actions.
- Follow guidelines for site reclamation in the Oil and Gas BMP section to protect soils, including topsoil conservation, scarifying or disking soil, recontouring the area, redistributing topsoil and providing ground cover through seeding or other methods. No soil should be imported from off-site to limit introduction of weeds.
- Actively patrol public lands to prevent unauthorized off-road travel. If unauthorized routes are found, block access to minimize further soil disturbance and reduce the potential for erosion through rehabilitation action.

1.5.1 Additional Information on BMPs for Soils

- Erosion and sediment control: http://www.cabmphandbooks.org
- OHV BMP Manual for erosion and sediment control: http://www.watchyourdirt.com/erosion-control-files/

1.6 Water Resources

California's Non-Point Source (NPS) Program Plan (adopted by SWRCB in December 1999) identifies 61 Management Measures (MMs) which constitute the State's BMPs for controlling NPS pollution. MMs applicable to BLM program and management actions include, but are not limited to, those that pertain to chemical management (pesticide and herbicide use), road construction and management, erosion and sediment control, hydro-modification, wetlands, and riparian areas. The BLM demonstrates compliance with the Clean Water Act and state water quality objectives by implementing BMPs that are consistent with the State's MMs. A suite of BMPs have been developed by various agencies, including the BLM, to address non-point source pollution on federal lands. These include, but are not limited to: those found in various RAC-approved rangeland health standards, BLM developed BMPs for renewable energy development, BMPs identified in the "Gold Book" for oil and gas development, and BMPs developed by the Forest Service Region 5 for various land management activities and authorized activities for lands in California. BLM activities authorized under this RMP will implement those most applicable for the local situation.

1.6.1 Water Resources Protection

- Employ erosion and sediment control measures during watershed restoration activities to reduce or eliminate erosion and sediment transport or incidental sediment discharge.
- Erosion control measures include mulching, placement of hay bales and other drainage control features, construction of rolling dips, and seasonal limits on operations.
- Protect the existing water quality improvement functions of wetlands and riparian areas as a component of NPS programs. Damaged wetlands or riparian areas should be restored where restoration of such systems will abate polluted runoff.
- Take measures to prevent the diffuse or point discharge of potential water pollutants onto the ground surface.
- Road construction/reconstruction shall be conducted so as to reduce sediment generation and delivery. This can be accomplished by, among other means, following designs for road systems, incorporating adequate drainage structures, properly installing stream crossings, avoiding road construction in streamside management areas, removing debris from streams, and stabilizing areas of disturbed soil such as road fills.
- Manage roads to prevent sedimentation, minimize erosion, maintain stability, and reduce the risk that drainage structures and stream crossings will fail or become less effective. Components of this measure include inspections and maintenance actions to prevent erosion of road surfaces and to ensure the effectiveness of stream-crossing structures. This measure also addresses appropriate methods for closing roads that are no longer in use.
- Confine runoff onsite to reduce impacts of mechanical site preparation and revegetation operations—particularly in areas that have steep slopes or highly erodible soils, or where the site is located in close proximity to a water body.
- Addresses the rapid revegetation of areas disturbed during road construction—particularly road systems where mineral soil is exposed or agitated (e.g., road cuts, fill slopes, landing surfaces, etc.).

- Do not apply chemicals within 100 feet of perennial streams or channels with beneficial use(s) recognized by the state.
- Do not apply chemicals directly into intermittent streams or channels with beneficial use(s) recognized by the state.
- Avoid aerial application of chemicals when wind speeds would cause drift.
- Construction activities that disturb one or more acres of soil or less than one acre but are part of a larger common plan of development or sale having the potential to disturb one or more acres (includes clearing, grading, and ground disturbances such as stockpiling or excavation) are required to obtain coverage under the General Permit for Discharges of Stormwater Associated with Construction Activity (Construction General Permit, Order 2009-0009-DWQ) and manage construction in accordance with permit requirements.

1.6.2 Mineral Exploration and Development

- Require that operators obtain all required state and federal permits for the protection of groundwater and surface water quality. Additional measures to protect water resources that may be included as Conditions of Approval (COAs) are described in Section 3.8.2 below. COAs specifically designed to protect groundwater include zone isolation, general casing depth and cement requirements, pressure testing, casing integrity testing, fluid surveys, and/or wellhead monitoring.
- Design roads, well pads, and facilities for exploratory wells to impact and fragment the least acreage practicable. New facilities shall be designed to maintain natural drainage and runoff patterns. Noncommercial wells shall be restored as soon as appropriate using BLM restoration methods.
- Prevent and repair soils subject to water erosion.
- Timely plugging and abandonment of depleted wells will be required. This includes plugging the well bore with cement, removing all materials and equipment, and recontouring/ revegetation as specified in the conditions of approval.
- Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the Environmental Protection Agency's Spill Prevention, Control, and Countermeasure regulation (40 CFR 112).
- The appropriate containment and/or diversionary structure would be sufficiently impervious to oil, glycol, produced water, or other fluid and would be installed so that any spill or leakage would not drain, infiltrate, or otherwise escape to the ground, surface, or navigable waters before clean-up is completed.
- Proper containment of oil and produced water in tanks, drilling fluids in reserve pits, and locating staging areas away from drainages would prevent potential contaminants from entering surface waters.
- Chemical containers should not be stored on bare ground or exposed to the sun and moisture. Labels must be readable. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity

puncture. All secondary containment must be designed to preclude entry from wildlife and livestock.

- Set and cement surface casings to sufficient depths to protect water bearing zones outside of the production zone(s).
- Consider the use of a closed loop drilling system. In the absence of a closed loop system, tanks and pits must be designed to preclude the entry of wildlife and livestock.
- Produced water from oil and gas operations would be disposed of in accordance with the requirements of Onshore Oil and Gas Order #7.

1.6.3 Additional Information on BMPs for Water Resources

- BLM Water Quality Law Summary: http://www.blm.gov/nstc/WaterLaws/Chap5.html
- Example BMPs from Pinedale, WY BLM Field Office:

  http://www.blm.gov/wy/st/en/programs/Planning/rmps/pinedale/feis_prmp.html

- Proposed Grazing Management Practices for Water Quality in California, from Rangeland Health Standards and Guidelines for California and Northwestern Nevada Final EIS: http://www.blm.gov/style/medialib//blm/ca/pdf/pa/rangeland_management/final_rangeland_health.Par.537ebc11.File.pdf/APPENDIX_10.pdf
- Policy for Aerial Delivery of Wildland Fire Chemicals near Waterways: http://www.fs.fed.us/rm/fire/wfcs/Application_Policy-MultiAgency_042209-UPDATE.pdf.
- USDA Forest Service Water Quality Management BMPs: http://www.fs.fed.us/r5/publications/water_resources/waterquality/water-best-mgmt.pdf
- http://www.waterboards.ca.gov/water_issues/programs/stormwater/bmp_database.shtml
- http://www.waterboards.ca.gov/water_issues/programs/nps/cammpr.shtml
- http://www.cabmphandbooks.com/

1.7 Cultural Resources

- Prior to the implementation of all proposed actions, cultural resource compliance with the National Historic Preservation Act, Section 106 and 110, will be coordinated pursuant to the current and any subsequent versions, supplemental procedures and amendments of the *National Programmatic Agreement Among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which the BLM Will Meet its Responsibilities Under the National Historic Preservation Act* and the *State Protocol Agreement Among the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer and the Nevada Historic Preservation Officer Regarding the Manner in Which the Bureau of Land Management Will Meet its Responsibilities Under the National Historic Preservation Act and the National Programmatic Agreement Among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation*. Should the either of these agreements be terminated, the BLM would comply with requirements under Sections 106

and 110 of the National Historic Preservation Act (NHPA) through the implementation of procedures put forth in 36 CFR 800.

- Archaeologists, law enforcement rangers, resource staff specialists, Native Americans, or designated volunteer stewards will patrol and monitor selected significant cultural resources on public lands in the Central Coast FO to reduce threats from human and natural disturbances.
- The BLM will coordinate with Native Americans, cultural resource specialists, interdisciplinary specialists, conservationists, and interested public, as appropriate, to apply the best available science to determine the amount and type of maintenance desired at cultural sites that are threatened by human or natural causes and how best to mitigate identified problems.
- The Central Coast FO will continue to support access by the Native Americans to traditional material collecting and gathering locations and ceremonial places. It is a federal policy to protect and preserve for the American Indian, the inherent right of freedom to believe, express, and exercise their traditional religions, including access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonies and traditional rites (American Indian Religious Freedom Act of 1978). Executive Order 13007, Indian Sacred Sites (1996), directs federal agencies to manage federal lands in a manner that accommodates Indian religious practitioners' access to and ceremonial use of Indian sacred sites and that avoids adversely affecting the physical integrity of such sacred sites, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions.
- Continue open dialogue and share information with Native Americans and ethnic groups that have cultural ties to lands managed by the Central Coast FO.
- Conduct cultural resource inventory and evaluations for all projects that require soil disturbance or cause a visual intrusion on a historic property. The presence or absence of cultural properties would be determined prior to the approval of any surface-disturbing activity. When cultural properties are present, the project would be redesigned or modified to safely avoid impacting cultural sites or steps would be taken to adequately mitigate impacts through project redesign or data recovery.
- Soil erosion can severely impact surface and subsurface cultural resource integrity. Potential secondary impacts on cultural resources caused by erosion would be analyzed during project planning. Residual impacts on cultural resources outside the project area would be carefully considered in surface-disturbing projects.
- Identification, safe avoidance, or mitigation of potential adverse effect on cultural properties shall be required as a condition of a lease, permit, license, and other federal undertakings for both external and internal projects.
- Any late discovery of a cultural or paleontological resource during a project would be reported to the authorized officer. All activity in the immediate discovery area associated with the project would be suspended until an evaluation of the discovery is made by the archaeologist to determine appropriate actions to prevent the loss of significant cultural, paleontological, or scientific values. A written authorization to resume the project, or to take appropriate mitigation action, would be issued by the authorized officer.

- Sensitive cultural resource records, site location information, and traditional cultural properties and values would be held confidential from the public as deemed appropriate to protect historic properties (NHPA, Section 304 [a], Archaeological Resource Protection Act [ARPA], Section 9[a]).
- It is the policy of the BLM to 1) avoid impacts on significant cultural resources and traditional properties and values whenever possible; 2) to retain a representative example of the full array of cultural resource site types; and 3) to avoid inadvertent loss or destruction of cultural and paleontological resources by BLM actions or authorizations.
- Additional archaeological surveys would be required in the event a proposed project or its location were changed or modified after the initial survey is completed. This survey, associated documentation, and necessary compliance would be completed prior to project approval.
- Apply necessary measures to protect and preserve National Register-eligible historic and prehistoric resources by sustaining integrity, physical form, and materials associated with cultural resources. This could include installation of protective barriers, fences, or site capping; using regulatory and informational signs, kiosks, and brochures; limiting visitor access to sensitive sites; taking preventive measures to reduce erosion and other natural disturbances to sites, conducting data recovery to preserve a site's informational potential; providing visitor educational and awareness information by various means, such as interpretive exhibits, workshops, and tours; patrolling and monitoring the condition of historic properties; and identifying cultural resources through proactive field inventory, oral history, and archival records data compilation.
- Pursue identification and nomination of cultural properties to the NRHP.

1.8 Oil and Gas Standard Operating Procedures, Implementation Guidelines and Conditions of Approval

Leasing fluid mineral resources does not confer on the lessee the right to conduct any ground disturbing activities related to exploring for or developing the resources until a subsequent environmental analysis of the actual proposed operations for the site is conducted. There are various stages of fluid minerals resource development within a lease, such as exploration, development, production, and reclamation/closeout. These activities all require additional BLM authorization. All proposed drilling or production operations for fluid minerals production proposed to be conducted on an existing lease must be approved before surface disturbance is allowed. Surface disturbance is proposed in APDs, ROWs, and Sundry Notices. During BLM NEPA review of these applications, site specific appropriate mitigation/environmental protection measures are developed and approved prior to conducting ground disturbing activities.

This sequential approval process (leasing, operations plan approval, etc.) allows BLM to consider application of restrictions at the appropriate action level. Restrictions are formulated at the proper stage when site specific information is available. This ensures that restrictions are not applied prematurely to avoid "potential" effects that might unnecessarily identify areas as being off-limits to leasing.

The following SOPs and implementation guidelines will be employed on all existing federal leases and private mineral developments, subject to the limits of BLM authority and the right of the owners/lessees to have reasonable access and development.

1.8.1 Implementation Guidelines

- All oil field activities that occur on land where the BLM has an interest, whether mineral or surface estate, should be conducted with the least impact practicable to sensitive resources.
- Wells that are not commercially developed should be reclaimed to natural contours and revegetated as soon as appropriate; i.e., restoration methods should consider timing of planting, acceptable species and evaluation criteria, and should be tailored to area-specific resource conditions and be compatible with the monument proclamation.
- Applications for permit to drill (APDs), sundry notices (leasehold activities requiring surface disturbance), and final abandonment notices will be reviewed using the existing NEPA approval process.
- Timely plugging and abandonment of depleted wells will be required. This includes plugging the well bore with cement, removing all materials and equipment, and recontouring/ revegetation as specified in the conditions of approval.
- Design roads, well pads, and facilities for exploratory wells to impact and fragment the least acreage practicable. New facilities shall be designed to maintain natural drainage and runoff patterns, reduce visual impacts, and reduce hazards to wildlife, especially California condors. Noncommercial wells shall be restored as soon as appropriate using BLM restoration methods.
- Good housekeeping requirements will be enforced (i.e., operators will be required to maintain a neat and orderly appearance of sites, remove junk and trash, and otherwise minimize landscape intrusions).
- Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the Environmental Protection Agency's Spill Prevention, Control, and Countermeasure regulation (40 CFR 112).
- Chemical containers should not be stored on bare ground or exposed to the sun and moisture. Labels must be readable. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture. The secondary containment must preclude entry from wildlife.
- Pipelines should be placed within existing disturbed rights-of-way, such as road shoulders, whenever possible.
- Roads shall be designed to an appropriate standard no higher than necessary to accommodate their intended functions.
- New wells and roads should be located in areas where cut and fill shall be minimized to the extent practicable.
- Operators will be encouraged or required to place multiple wells on a single pad where feasible in order to minimize unnecessary disturbance.
- Operators shall be required to maintain clean well locations and to remove trash, junk, and other materials not in current use.

1.8.2 Conditions of Approval

Conditions of Approval (COAs) are site-specific requirements included in an approved Application for a Permit to Drill (APD) or Sundry Notice that may limit or amend the specific actions proposed by the operator. COAs minimize, mitigate, or prevent impacts to public lands or other resources. Best Management Practices may be incorporated as a COA.

The standard fluid minerals lease is used to provide an overall framework for regulation of operations. This framework is built upon by adding stipulations to the lease and, later if operations are proposed, by adding site appropriate COAs. These additional protection and mitigation measures are developed and applied during BLM's review and approval of individual APDs, rights-of-way, Sundry Notices, etc. The measures are developed and assessed in a site-specific NEPA document and are made conditions of approval of any subsequent operational approvals.

1.8.3 Central Coast Field Office Specific SOPs and COAs

The BLM will inspect and monitor oil field activity in the following phases of oil and gas development:

- Geophysical/Seismic Operations;
- Drilling a New Well;
- Interim Reclamation of a Producing Well;
- Regular Production and Environmental Surface inspections;
- Temporary Abandonment of a Producing Well (idle well);
- Plugging and Abandonment of a Well;
- Surface Reclamation.

The following describes the SOPs and COAs applicable to each of the oil and gas development phases on existing federal oil and gas leases.

1.8.4 Geophysical Exploration

There are two primary methods of generating seismic data. The first involves a group of several large vehicles (vibroseis, or "thumper trucks") traveling along specific paths both on and off-road throughout the study area, frequently stopping to place a metal pad in contact with the ground, and then vibrating the pad to send soundwaves down into the earth. The second involves placing a small explosive charge in a series of shallow holes a few inches in diameter. The explosives are detonated simultaneously, sending soundwaves into the ground. Regardless of which method is used (and sometimes a combination is used), the soundwaves reflect off of underground strata and return to the surface. At the surface, the signals are received by an array of very sensitive microphones that are laid on the surface in pre-designated areas. The electronic signals are processed by proprietary programs, and the resulting data can be interpreted by geophysicists, geologists, and engineers, providing an idea of where zones may be that could contain oil or gas. Historically, there were many 2-D seismic shoots, where only a single line of data is gathered. During the past few years, however, the trend is towards large scale 3-D seismic surveys. These surveys are comprised of a series of closely spaced lines in one direction, followed by another series of lines perpendicular to the first set. These large 3-D projects can involve thousands of miles of surveys.

Project Reconnaissance

A general reconnaissance of the project area will be conducted to describe the project area and to determine the extent of listed species presence and habitat. This information will used to identify areas where listed species are likely to occur, land uses that preclude listed species use, topography that may preclude listed species use, habitat types that support listed species, and the extent of small mammal burrowing activity along source lines, receiver lines, travel routes, and staging areas. Reconnaissance surveys will be supplemented by conducting general field visits of the project area, obtaining aerial images of the project area, land ownership, slope and topographic features, general habitat or vegetation mapping, and land use maps using GIS, California Natural Diversity Data Base, and other information for the project area.

Avoidance Criteria

Source Points: Vibroseis, Shot Hole, and Staging Areas

Vibroseis and shothole drilling and vehicle staging avoidance criteria for off-road locations (minimum exclusion zone radius):

- 200 feet from occupied San Joaquin kit fox natal or pupping dens;
- 150 feet from known San Joaquin kit fox natal or pupping dens;
- 100 feet from occupied San Joaquin kit fox dens;
- 100 feet from known San Joaquin kit fox dens;
- 50 feet from potential San Joaquin kit fox dens;
- 50 feet from giant kangaroo rat burrow systems;
- 30 feet from potential or known San Joaquin antelope squirrel burrows;
- 30 feet from potential or known blunt-nosed leopard lizard burrows;
- 50 feet from badger dens;
- 50 feet from burrowing owl burrows;
- 50 feet from populations of listed plants; and
- Natural vernal pools and natural ponded waters will be avoided by 300 feet (Table 1 – above).

Travel Routes

- Where seismic lines cross natural areas, the survey corridor within which testing and ancillary vehicles operate shall be limited to a maximum width of 25 feet (12.5 feet on either side of the centerline).

Receiver Lines

- Receiver lines will be walked if necessary to avoid direct impacts on features such as dens or burrows, vernal pool areas, or listed plants.
- Where receiver lines are driven by ATVs/UTVs, avoidance buffers will be enforced.

Geodetic Surveys

Geodetic surveys of the source and receiver points in listed species habitat shall be completed in a manner to avoid impacts on listed species.

- Surveys may be conducted without biological monitors where all cross-country activities in listed species habitat will be conducted on foot, with ATVs/UTVs confined to existing roads and two-track trails.
- Where ATVs/UTVs are used traveling cross-country in potential listed species habitat, biological surveys to identify travel routes and avoidance zones shall be completed before, or concurrent with, conducting the geodetic surveys.
- ATVs/UTVs may be used outside of potential listed species habitat without biological surveys where speeds are not in excess of 10 miles per hour in cross-country travel. All habitat features (e.g., burrows, dens, listed plant populations) shall be avoided. If this is not possible, biological monitors shall accompany survey crews using ATVs/UTVs.
- If ATVs/UTVs are observed to collapse burrows, compact or disturb soil, uproot plants, or cause mortality to native shrub species, activities shall be conducted on foot.

Source Point Activities

Geophysical surveys of the source points and all associated travel in listed species habitats shall be completed in a manner to avoid impacts on listed species.

- Before commencement of seismic testing activities, an agency-approved biologist shall conduct pre-activity surveys of proposed vibrator, shot hole, source point travel paths, and staging areas in listed species habitats.
- Where seismic lines cross threatened or endangered species habitat, the survey corridor within which testing and ancillary vehicles operate shall be limited to a maximum width of 25 feet (12.5 feet on either side of the centerline). These activity zones shall be reduced, where possible, to avoid endangered species sites such as occupied kit fox dens or kangaroo rat burrows.
- All cross country vehicle travel will remain on the flagged routes and will avoid marked burrows.
- Small shot hole drilling vehicles, such as tractor-mounted drill rigs or ATV/UTV-pulled drill trailers, are suggested for use on conserved lands (CDFW, some BLM, CNLM, other lands with threatened and endangered conservation easements, HCP conservation management areas, etc.) and in likely blunt-nosed leopard lizard habitat.
- San Joaquin kit fox dens and giant kangaroo rat, San Joaquin antelope squirrel, and blunt-nosed leopard lizard burrows shall be flagged for avoidance. As necessary to protect these species, additional habitat features shall be identified and flagged for avoidance.
- Project effects will be monitored for species impacts as work progresses at source points, along travel routes, and at staging areas.
- Biological monitors will work with equipment operators to avoid burrows, dens, and features where biological surveys were conducted before seismic survey activities.
- If biological surveys are conducted within 14 days of source point activities, survey routes do not need to be resurveyed ahead of source point vehicle travel.
- If biological surveys were conducted greater than 14 days before source point activities, biological monitors will be required to actively monitor and resurvey as necessary travel routes

and point locations to ensure that avoidance buffers are applied to any new listed species occurrences.

- Pre-activity surveys will be conducted immediately ahead of seismic vehicle and drill rig deployment where previous surveys were not completed, providing that all avoidance buffers will be met.
- All project vehicles shall observe travel avoidance routes described in the biological pre-activity survey notes that provide for avoidance of sensitive wildlife and special status plant resources.
- If avoidance distances cannot be met, a qualified biologist may request permission to flag a rerouted travel corridor that avoids direct damage to burrows, dens, shrubs, or other habitat features.
- Source points may be skipped or moved to meet avoidance buffer criteria.
- The applicant shall make every reasonable effort to prevent collapse of dens and burrows by relocating source points to avoid dens and burrows or other means such as establishing exclusion zones as described above.
- Damage to shrubs will be minimized to the maximum extent practicable.
- Project related vehicles will be confined to existing primary or secondary roads or to specifically delineated project areas that have had biological surveys to avoid listed species.
- Vibroseis vehicles may be used on existing roads within avoidance buffer distances provided that biological monitors shall accompany vibroseis crews to avoid direct impacts on listed species in roads where disturbance will occur.

Receiver Line Activities

Geophysical surveys of the receiver points and all associated travel in listed species habitats shall be completed in a manner to avoid impacts on listed species.

- Before deployment of receiver lines, geophones, and related equipment, a qualified biologist shall conduct pre-activity surveys of proposed geophone travel paths and receiver points. This may be done after the geodetic survey, but before the receiver line deployment.
- All San Joaquin kit fox dens, giant kangaroo rat, San Joaquin antelope squirrel, blunt-nosed leopard lizard burrows, and listed plant populations within the immediate vicinity of receiver lines, and points shall be prominently staked or flagged to alert project personnel to their presence.
- All project-related flagging shall be collected and removed after completion of the project.
- Damage to shrubs will be minimized to the maximum extent practicable.
- Vehicles traveling cross-country will remain on flagged routes and will avoid marked burrows. A biologist will assist project-related receiver line cross-country travel, geophone placement, and staging areas to avoid listed species and their habitat features.

Habitat Mitigation Measures

Geophysical surveys of the source and receiver points and all associated travel in listed species habitats shall be completed in a manner that minimizes impacts to listed species habitats.

- During geophone deployment, work crews shall make every reasonable effort to avoid damaging shrubs, washes, drainage banks, and cryptogramic crusts.
- Small shothole drilling vehicles, such as tractor-mounted drill rigs or ATV/UTV-pulled drill trailers, are suggested for use in listed species habitats.
- Off-road travel corridors shall be clearly delineated to contain project-related vehicles within marked travel routes to reduce impacts on large shrubs and washes.
- Damage to shrubs will be minimized to the maximum extent practicable.
- Project-related vehicles shall be restricted to approved travel routes and paths/roads.
- Large shrubs shall be avoided by carefully selecting travel paths/roads to avoid crushing shrubs.
- Washes shall be avoided by all vehicular activity to the maximum extent practicable. Washes will be crossed to minimize project impacts. Washes shall not be used as travel routes.

Additional Species-Specific Mitigation Measures

Blunt-Nosed Leopard Lizard

When the project area is within the known range of blunt-nosed leopard lizards, the following measures will be implemented:

- Shrubs will be avoided to the maximum extent practicable.
- All potential burrows that may be used by blunt-nosed leopard lizards will be avoided.
- Project activities will be conducted during daylight when lizard activity is likely, but no daytime temperature criteria are required.
- Small shothole drilling vehicles, such as tractor-mounted drill rigs or ATV/UTV/UTV-pulled drill trailers, are suggested for use in likely blunt-nosed leopard lizard habitats.
- ATVs/UTVs may be used where avoidance criteria can be met.
- Vibroseis vehicles may be used on existing roads within buffer distances provided that biological monitors shall accompany vibroseis crews to avoid direct impacts on blunt-nosed leopard lizards.
- Biological monitors will look for active leopard lizards aboveground within and directly adjacent to the seismic cross-country travel corridors.
- Vehicles parked in blunt-nosed leopard habitat for greater than one hour shall be inspected under and around the vehicle for BNLL. Vehicles will not be moved until any BNLL observed have moved a safe distance to avoid being crushed.
- All potential burrows of this species will be flagged for avoidance within avoidance buffer zones.
- Potential habitat will be considered suitable for blunt-nosed leopard lizards within the range of the species by the following criteria:
    - Slope is less than 30%, most favorable less than 10%,
    - Vegetation density is open to allow blunt-nosed lizard movements, and
    - Burrows are available and suitable for BNLL use.

San Joaquin kit fox

If damage or destruction to a known or occupied San Joaquin kit fox den cannot be avoided during project activities, the BLM and USFWS shall be contacted immediately for guidance.

Listed Plant Species

- Vibroseis units and drill buggies/tractors/ATV/UTV/UTV-trailers will follow flagged routes around areas of listed plants. A 50-foot avoidance zone for special-status plant species will be enforced.
- Avoid populations of Hoover's woolly-star, San Joaquin woolly threads, and California jewelflower to the maximum extent practicable in the growing season (from first significant rains and germination to flowering; ~early November – early April). Populations of special-status plants will be avoided by relocating and/or reconfiguring source points, receiver points and travel routes. If it becomes necessary to locate a project in an area where Hoover's woolly-star, San Joaquin woolly threads, or California jewelflower is known or thought to be present, every reasonable effort shall be made to wait until after seed set before beginning ground disturbances.
- Seismic surveys may be delayed until after seed set of listed plant species (generally after May 1).
- Avoid special-status plant species by relocating source points, travel routes, and receiver points to avoid listed plant populations by 50 feet.

Other Mitigation Measures

- Before the onset of ground disturbing project activities, a qualified wildlife biologist shall provide an employee orientation program to project personnel on the occurrence and distribution of listed species in the project area, measures being implemented to protect these species during project actions, reporting requirements should incidental take occur, and applicable definitions and prohibitions under the Endangered Species Act.
- Qualified biologists shall accompany seismic survey vehicles and crews in areas with the potential to affect listed species.
- At least one qualified biologist shall accompany each vibrator set or drill rig crew working within endangered species habitat.
- Qualified biologists will be responsible to implement survey, take avoidance, monitoring, and reporting activities and shall perform the following:
    - Aid seismic crews in satisfying avoidance criteria and implementing project mitigation.
    - Aid seismic crews in relocating source points and receiver lines as necessary.
    - Observe and note all pertinent information concerning project effects on listed species.
    - Avoid the take of blunt-nosed leopard lizards and destruction of associated burrows.
    - Assist the seismic contractor in conducting the proposed project in such a manner as to avoid adverse effects on endangered and threatened species.

- Biological monitors are expressly empowered to order cessation of seismic activities if take avoidance and mitigation measures are violated.
- Biological monitors or the project environmental representative shall notify the BLM and USFWS before or as soon as possible after biological compliance measures are violated.
- At least one biological monitor shall accompany vibroseis and shot hole crews while working within endangered species habitat.
- Project biologists shall keep an accurate running tally of the number of dens and burrows damaged, destroyed, or otherwise affected by project activities. Such tallies shall be combined and totaled at the end of each workday to determine proximity to take limits and the need for subsequent project modifications to prevent impacts upon dens and burrows in excess of take limits. Total number of dens and burrows affected by the project shall be reported in the post-activity compliance report.
- One biologist exclusive of biologists observing vibrator crew activities shall oversee activities of receiver line deployment crews where cross country vehicle travel occurs in listed species habitat.
- Pets shall not be permitted on the project site during project activities.
- All food-related trash such as wrappers, cans, bottles, and food scraps shall be disposed of in closed containers only and regularly removed from the project site.
- Although highly unlikely to occur, all spills of hazardous materials within endangered species habitats shall be cleaned up immediately according to applicable federal, state, and local laws and regulations.
- Daily preparation and end of day maintenance will be conducted no earlier than two hours before sunrise and not later than two hours after sunset. These activities include refueling of vibroseis and other project related vehicles, moving some vehicles to staging areas, etc. These activities, however, will not include significant vehicle travel in listed species habitat. No off-road vehicle travel shall be conducted within sensitive species habitat until there is sufficient natural light for resource avoidance.
- All project-related vehicles shall observe a speed limit of 10 mph or less on all routes that traverse endangered species habitat, except on State and County highways and roads.
- To prevent the inadvertent entrapment of vertebrates, all project-related open steep-walled holes, or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured protected species is discovered, the BLM and USFWS shall be contacted immediately for guidance.
- If during any phase of the seismic operation any oil or other pollutant is discharged from project related vehicles or from containers, the control, cleanup, and disposal of such oil or other pollutant shall be the responsibility of the permit holder, regardless of fault. Upon failure of permit holder to control, cleanup, or dispose of such discharge on or affecting federal lands or to repair all damages to federal lands resulting from, the authorized officer may take such measures as he/she deems necessary to control and cleanup the discharge and restore the area,

including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the permit holder. Such action by the authorized officer shall not relieve the permit holder of any liability or responsibility.

Vegetation and Habitat Types

Project related vehicles should be restricted to approved travel routes and paths/roads. Large shrubs shall be avoided in an effort to minimize impact on wildlife habitat. Large shrubs shall be avoided by carefully selecting travel paths/roads to avoid crushing individuals. In addition, washes represent a fragile habitat type and function as seasonally productive sources of annual vegetation for animals, as dispersal corridors, and as areas affording favorable burrow construction habitat. Washes shall be avoided by all vehicular activity as feasible.

Post-Project Reporting

- Within 45 calendar days after completion of the project, the seismic contractor shall submit to the USFWS and BLM a post-activity compliance report that details the following information:
    - Dates that seismic testing occurred.
    - Pertinent data concerning the seismic contractor's success in meeting project mitigation measures.
    - Known project effects on San Joaquin kit foxes, blunt-nosed leopard lizards, giant kangaroo rats and San Joaquin antelope squirrels, if any (including specific number of dens and small mammal burrows damaged or destroyed).
    - Occurrences of incidental take of state or federally listed species.
    - An assessment of the extent and severity of project impacts on all sensitive wildlife habitats, a summary of rehabilitation plans, if any; and other pertinent information.
- BLM, USFWS and CDFW shall be notified in writing within three (3) working days in the event of an accident death or injury of a San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, or of the finding of any dead or injured individuals of the aforementioned species during the proposed seismic survey. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured animal, and any other pertinent information. The USFWS contact for this information is the Chief of the Division of Endangered Species, Sacramento Field Office, 3310 El Camino Avenue, Suite 130, Sacramento, CA 95821-6340, (916) 979-2725. The CDFW contact information is the California Department of Fish and Wildlife, Fresno Regional Headquarters, Environmental USFWSs Division, 1234 E. Shaw Ave., Fresno, CA (559) 243-4014. Any dead or injured kit fox, giant kangaroo rat, blunt-nosed leopard lizard, or San Joaquin antelope squirrel shall be turned over to the California Department of Fish and Wildlife.

1.8.5 Drilling A New Well

After an APD has been received by the Central Coast FO, a review of engineering design and potential effects on sensitive resources will be undertaken. During the review stage of an APD, either the operator or the BLM will note site-specific concerns on the application. Modified proposals will be developed cooperatively with the applicant to ensure that the modified project still meets the applicant's objective. The applicant will be informed within ten days of receipt of the APD if there are

deficiencies that need to be corrected. Any special conditions will be attached to the APD by the BLM as COAs. In addition to BLM-wide regulations, the Central Coast FO has developed its own local procedures, as follows:

Pits. The BLM encourages the use of closed-loop or semi closed-loop mud systems whenever possible. If pits are utilized, they must remain free of any hydrocarbons. Hydrocarbons should be removed from pits upon discovery. If the natural topography is sloping, the pit will be constructed on the cut side of the well pad. Pits must preclude wildlife entry after all boring wastes have been discharged. Netting or other effective methods will be utilized to preclude wildlife entry. Flagging of pits is no longer considered an effective means to prevent wildlife entry to pits.

Steam Injectors. All steam injection wells within a 300-foot radius of a new location must be shut in a minimum of three days before the spudding (beginning drilling operations) of a new well.

Conductor Pipe. A minimum of 50 feet of conductor pipe is to be set and cemented to the surface. The conductor pipe must be equivalent to or exceed the properties of A-25-grade line pipe.

Diverter. Before spud, a diverter system will be installed on the conductor pipe and function tested. The test shall be recorded in the drilling log. The diverter system, at a minimum, shall consist of an annular type preventer (minimum working pressure 1,000 psi), 2-inch (minimum ID) kill lines, and 6-inch (minimum ID) diverter lines with no internal restrictions or turns. A full opening, hydraulically controlled valve shall be installed in the diverter line that will automatically open when the annular preventer is closed. The accumulator system should have sufficient capacity to close the annular preventer and open the hydraulically controlled valve.

Remote controls for the diverter system shall be located on the rig floor and readily accessible to the driller. Remote controls shall be capable of closing the annular preventer and opening the hydraulically controlled valve. Master controls shall be located at the accumulator and should be capable of closing and opening the annular preventer and opening the hydraulically controlled valve. The diverter system shall be function-tested daily and the test recorded in the drilling log.

General Casing and Cementing. A Subsequent Report (Form 3160-5) detailing the size, weight, and grade of the casing; the amount and type of cement, including additives; and a copy of the service company's materials ticket and job log shall be submitted to the BLM within five business days following the cementing of the casing string. Each casing string (except conductor pipe) shall be pressure tested, before drilling out the casing shoe, to 0.22 psi/ft of casing string length or 1,000 psi, whichever is greater, but not to exceed 70% of the internal yield pressure of the casing. The casing pressure test shall be recorded in the drilling log. The wait-on-cement time for each casing string shall be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe before drilling out.

Drilling Fluids. Sufficient quantities of drilling fluid (mud and water) shall be maintained at the well site, at all times, for the purpose of controlling steam kicks.

1.8.6 Temporary Abandonment of a Producing Well (Idle Well)

Oil and gas exploration and development are cyclical businesses, with periods of high and low levels of activities. On occasion, an operator may decide to temporarily "shut in" producing wells and wait for conditions to improve. The highly viscous nature of most Fresno County crude oil, typical low well head

pressures, and the relatively low corrosive properties of the fluids (low sulfur crude) make the known dangers of shutting in a well for long periods and then bringing it back online less of a mechanical problem in the Central Coast FO than in other producing regions of the country. Monitoring and correcting the problem has been successfully undertaken by the California Division of Oil, Gas, and Geothermal Resources and the Central Coast FO.

The following additional conditions *may* be required before the temporary abandonment of a producing oil/gas well, service well, or an injection well.

Zone Isolation. The requirement to isolate the producing interval (General Requirement #4) is waived. This waiver is based on the information submitted with the application and the geologic data in *Volume II - California Oil and Gas Fields*, (field name) which indicates the absence of usable water aquifers above the producing horizon in (section in which well is located).

Mechanical Integrity of Casing. The mechanical integrity of the casing may be determined using the ADA pressure test method.

Fluid Surveys. In accordance with the requirements of the State of California Idle Well Program, a fluid level survey will be performed at two- to five-year intervals while the well is temporarily abandoned. A copy of the survey will be submitted to the BLM within five business days of the survey.

Monitoring of Wellhead Pressures and Temperatures. Wellhead pressure and temperature will be continuously monitored while the well is temporarily abandoned. Any pressure/temperature change will be promptly reported to the BLM.

Isolation of the Producing Interval. The producing interval shall be isolated by setting a plug in the casing within 100 feet above the producing interval if a rising fluid level, an increasing wellhead pressure, or an increasing wellhead temperature is detected. The plug could be either a retrievable or drillable-type bridge plug or a cement plug of at least 100 feet in length.

1.8.7 Plugging and Abandonment of a Well

Onshore orders describe the plugging procedure. Final abandonment would normally be witnessed by the BLM. No final surface site marker is required by the Central Coast FO, but a permanent buried marker is required.

1.8.8 Surface Reclamation (Interim or Final)

Reclamation is required of any disturbed surface that is not necessary for continued production operations. Conditions for the recovery of an oil well site are unique to each area's ecosystem and habitat. The following examples of COAs have been developed for use within the Central Coast FO. The applicability of any or all of these COAs will be determined based on site-specific conditions.

General:

- The operator shall recontour the disturbed area and obliterate all earthworks by removing embankments, backfilling excavations, and grading to reestablish the approximate original contours of the land in the area of operation.

- The operator shall uniformly spread all on-site topsoil over all unoccupied disturbed area. Spreading should not be done when the ground or topsoil is frozen or wet. No topsoil shall be imported to the site from an off-site source in order to limit the introduction of weeds.
- The operator (or holder) shall prepare a seedbed by scarifying the disturbed area, distributing on-site topsoil uniformly, and possibly disking the topsoil, as directed by the BLM authorized officer.
- The operator shall seed all disturbed area, using an agreed on method suitable for the location. Locally collected seed should be used. Additional restoration efforts will be required if a satisfactory stand is not obtained, as determined by the BLM authorized officer upon evaluation after the first growing season.
- The operator shall arrange to have a biologist available to assist the construction workers in the identification and avoidance of endangered species.

Producing Wells:

- Interim site reclamation for producing wells shall be accomplished for portions of the site not required for continued operation of the well. The following measures are typical reclamation requirements:
  - Production facilities and equipment placed to maximize room for interim reclamation;
  - Closing drilling fluid pit (mud pit) if present;
  - Recontouring the pad, leaving only enough level ground for possible future workover operations;
  - Cut and fill slope vegetation;
  - Interim reclamation of access roads;
  - Site fencing;
  - Berm removal and site grading;
  - Polluting substances and contaminated materials disposed of properly.
- The Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "The Gold Book" (Current Edition) should be referenced for more detailed information.

Non-producing Wells.

- Rehabilitation on the entire site shall be required and should begin as soon as practical, depending on prevailing weather conditions. Cut and fill slopes shall be reduced and graded to blend to the adjacent terrain.
- Drilling fluids held within pits may be allowed to dry for up to six months. Fluids that will not dry must be removed. All polluting substances or contaminated materials, such as oil, oil-saturated mineral substrates, shall be removed to an approved site.
- Drainages shall be reestablished, and temporary measures will be required to prevent site erosion until vegetation is established.
- After final grading and before replacement of on-site topsoil, the entire surface of the site shall be ripped and/or scarified to eliminate compaction and to promote soil moisture infiltration and root penetration. On-site topsoil should then be spread over the site to achieve an approximate, uniform stable thickness consistent with the established contours. No topsoil should be imported to the site from an off-site source in order to limit the introduction of weeds.

Final Reclamation:

- Plug the well and remove all associated infrastructure.
- Recontour the well site to the original contour or a contour blend with the surrounding landform; evenly redistribute stockpiled on-site topsoil; and revegetate the site.
- If roads are not needed for other purposes, recontour the road back to the original contour and seed to promote revegetation.

1.9 Visual Resources

Visual Resource BMPs provide a variety of tools to address the visual impacts of projects on the landscape. They are applied to reduce or eliminate visual contrast in order to maintain or achieve Visual Resource Management (VRM) objectives. BMPs for visual resources include a variety of techniques from proper site selection for projects, to minimizing long-term surface disturbance and correct color selection for painting structures. Not all techniques are appropriate for all locations and would be implemented as appropriate. As with all BMPs the science and technology; specifically camouflaging techniques, behind the management is continually evolving as such new BMPs are developed and replace other concepts. More information on BMPs for visual resource management can be found in several BLM publications and websites including the 2007 Visual Resource Management for Fluid Minerals self-study guide found at: http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html.

Appendix E

Scoping Report

US Department of the Interior
Bureau of Land Management
Hollister Field Office

Oil and Gas Leasing and Development
Environmental Impact Statement and Resource Management Plan Amendment

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SCOPING SUMMARY REPORT
AUGUST 2014

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
BLM	United States Department of the Interior, Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EIS	environmental impact statement
EPA	US Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act of 1976
HFO	Hollister Field Office
ISA	Independent Science Assessment
NEPA	National Environmental Policy Act
NOI	Notice of Intent
RAC	Resource Advisory Council
RMP	resource management plan
ROD	record of decision
US	United States

SUMMARY

The United States (US) Department of the Interior, Bureau of Land Management (BLM) has conducted a scoping process to solicit public comments on how oil and gas resources on federal mineral estate should be managed in the BLM's Hollister Field Office (HFO) and whether the BLM should include areas of California beyond the HFO in this process.

This is the first phase of a process that may lead to the amendment of the Hollister Resource Management Plan (RMP) (2007). The BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices).

The HFO is located in west-central California and encompasses 12 counties either in part or in full. Within the HFO, the BLM manages approximately 270,000 acres of subsurface mineral estate underlying federal surface land and 588,000 acres of subsurface mineral estate underlying privately owned land, otherwise referred to as "split estate" lands.

The BLM has an obligation to evaluate the potential impacts of its decisions under the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190). For this RMP amendment effort, NEPA would be implemented through the preparation of an environmental impact statement (EIS). The RMP Amendment/EIS will comply with NEPA and with the Federal Land Policy Management Act (FLPMA) as required under 43 Code of Federal Regulations (CFR) 1601.0-6. The resulting RMP Amendment/EIS will also comply with the criteria outlined in the BLM's H-1601-1 Land Use Planning Handbook (BLM 2005).

Goals of the Public and Agency Collaboration and Communication Efforts

The policy of the BLM is to provide opportunities for the public, various groups, other federal agencies, tribal individuals and organizations, and state and local

governments to participate meaningfully and substantively and to give comments to the BLM during the preparation of the EIS. The BLM encourages various partners, cooperating agencies, and stakeholders to become involved in the process and provide information on local and regional factors unique to the project area. Local and regional factors include knowledge of area customs and culture, community values and traditions, and the social and economic makeup of the planning area. The BLM's goal is to consider these factors in a manner that is inclusive rather than exclusive, wherein key tribal, community, agency, and interest groups are provided with opportunities to participate in the process and are kept informed of the status of the project. The BLM must also ensure that participants are made aware of the effect their involvement will have on the final outcome; follow-through is a key element in meeting the goal of collaborative planning. Consensus among the participants wherever possible is desirable; where no consensus can be reached, the plan must explore reasonable alternatives that have been discussed with the participants.

Strategies on coordinating with other federal, state, and local agencies and private groups include, but are not limited to, conducting public information meetings, workshops, small group presentations, and management briefings; hosting field trips; issuing news releases; mailing informational materials; producing EIS planning updates; publishing newspaper notices; making media announcements; printing brochures, booklets, and pamphlets; and initiating other informal contacts.

Scoping is the term used in the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 et. seq.) to define the early and open process for determining the scope of issues to be addressed in the planning process. The scoping process serves a number of purposes. It provides an avenue to involve the public in identifying significant issues related to potential land use management actions and helps identify any issues that are not significant and can thereby be eliminated from detailed analysis. The list of stakeholders and other interested parties is also confirmed and augmented during the scoping process.

Public Scoping Activities

The formal public scoping period as required by NEPA began on August 5, 2013, with the publication of a Notice of Intent (NOI) in the *Federal Register*, and ended on February 28, 2014.

Public outreach for the EIS since publication of the NOI has included the following:

- An EIS planning update mailed to federal, state, and local agencies; tribal individuals and organizations and federally recognized tribes; interest groups; and members of the general public after publication of the NOI and at least two weeks prior to the first scoping meeting

- Four legal notices published in the following local newspapers:
  - San Benito County Today
  - Monterey Herald
  - The Fresno Bee
  - The Sacramento Bee
- Four scoping public meetings held in January and February 2014 in Hollister, Sacramento, Salinas, and Coalinga, California
- A public website that provides access to materials distributed at scoping meetings as well as information on the public involvement process
- Letters to 35 federal, state, and local agencies inviting them to be cooperating agencies for the project
- Letters to 28 tribal individuals and organizations, including the Tachi Yokut Tribe of Santa Rosa Rancheria to initiate consultation under Section 106 of the National Historic Preservation Act

The public scoping process provides a variety of opportunities for federal, state, and local agencies, interested organizations and industries, and members of the general public to express their comments and to provide meaningful input to the process.

Public Scoping Results

The BLM received 132 unique written submissions, including a letter from the non-governmental organization CREDO that included 10,577 electronic signatories, and another form letter from three individuals. In total, 734 unique comments were received during the public scoping period. Comments were categorized, coded, entered into a database, tallied, and analyzed. Categories included RMP planning process categories (e.g., how the comment relates to the RMP amendment process), planning issues, and commenter affiliation.

Members of the general public provided 110 written submissions (83.3 percent) during the scoping period, organizations or non-profit groups submitted 13 comments (9.8 percent), and businesses submitted 2 comments (1.5 percent). Federal agencies submitted 2 written submissions (1.5 percent), and local governmental agencies submitted 4 written submissions (3.0 percent). Tribal individuals and organizations submitted 1 written submission (0.8 percent). No written submissions were received from state government agencies, educational organizations, or elected officials.

Issue Summary

Based on scoping, the following planning issues have been identified. Comments received were classified into the planning issues below.

- Issue No. 1: Water Resources
- Issue No. 2: Health and Safety
- Issue No. 3: Vegetation and Wildlife
- Issue No. 4: Air Quality
- Issue No. 5: Climate Change
- Issue No. 6: Geology and Seismicity
- Issue No. 7: Soil Resources
- Issue No. 8: Socioeconomics
- Issue No. 9: Traffic
- Issue No. 10: Tribal and Cultural Resources
- Issue No. 11: Environmental Justice
- Issue No. 12: Land Use
- Issue No. 13: Livestock Grazing
- Issue No. 14: Recreation
- Issue No. 15: Visual Resources

The BLM will use the planning issues to help guide the development of a reasonable range of alternative management strategies for oil and gas management in the RMP amendment. In addition to planning issues, comments also addressed issues that are policy or administrative actions and issues that have been or will be addressed by the HFO outside of the RMP amendment, either because they are implementation-level decisions or otherwise beyond the scope of this RMP amendment.

Future Steps

Scoping is the first opportunity for public involvement in the RMP amendment process. The HFO will use the information collected during the scoping period to formulate alternatives and prepare the Draft RMP Amendment/EIS. Scheduling for the project beyond the scoping phase has not yet occurred. Release of the Draft RMP Amendment/EIS will be announced in a Notice of Availability in the *Federal Register* and in the local media as well as posted on the project website. Additional public meetings will be held to solicit public comment on the draft document, likely in the same locations as the scoping meetings. Public comments will be analyzed and used to update alternatives and impacts where applicable. At the conclusion of the public comment period, the Draft RMP Amendment/EIS will be revised, and a Proposed RMP Amendment/Final EIS will be published and made available for public review. While these are the specific opportunities for public involvement during the RMP amendment process, the BLM will consider input from the public throughout the process.

SECTION 1
INTRODUCTION

The United States (US) Department of the Interior, Bureau of Land Management (BLM), Hollister Field Office (HFO) is preparing a resource management plan (RMP) amendment and associated environmental impact statement (EIS) to guide management of oil and gas resources on BLM-administered mineral estate within the HFO. The RMP Amendment/EIS will amend the existing 2007 Hollister RMP, as amended (BLM 2007).

The planning area is initially being proposed as the area encompassed by the HFO. The BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (e.g., Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices). The decision about the final geographic scope of the EIS will be based on public comments received during scoping and the results of the BLM-sponsored peer-reviewed Independent Science Assessment (ISA) of Well Stimulation Technologies.

The ISA is a separate but parallel document being prepared by the California Council on Science and Technology. The ISA will inform the development of this RMP Amendment/EIS and other future decision-making in the California BLM Oil and Gas Management program. The ISA will also address questions and comments brought up by the public during the scoping period. For more information about the ISA, refer to **Section 5.1,** Independent Science Assessment (ISA).

The HFO encompasses all or portions of 12 counties in west-central California, including the following. The proposed planning area includes federal, state, and private lands.

- Alameda County
- Contra Costa County

- Fresno County
- Merced County
- Monterey County
- San Benito County
- San Francisco County
- San Joaquin County
- San Mateo County
- Santa Clara County
- Santa Cruz County
- Stanislaus County

Once the planning area is defined, the decision area will include only the BLM-administered surface land and subsurface mineral estate underlying privately owned lands within that planning area. If the planning area were limited to HFO, the decision area would be composed of 270,000 acres of subsurface mineral estate underlying federal surface land and 588,000 acres of subsurface mineral estate underlying privately owned land, otherwise referred to as "split estate" lands.

The EIS and RMP amendment process will result in a Record of Decision (ROD) and an amended RMP.

1.1 Background of the Resource Management Plan Amendment Process

The BLM land use planning process yields a dual-functioning document: an RMP and an EIS. An RMP is a land use plan that describes broad multiple-use direction for managing public lands administered by the BLM. The Federal Land Policy and Management Act of 1976 (FLPMA) directs the BLM to develop such land use plans to provide for appropriate uses of public land. Decisions in land use plans guide future land management actions and subsequent site-specific implementation decisions. These decisions establish goals and objectives (desired outcomes) for resource management and the measures needed to achieve them. These measures are expressed as actions and allowable uses (i.e., lands that are open or available for certain uses, including any applicable restrictions, and lands that are closed to certain uses). The EIS portion of the document identifies the environmental consequences of achieving the goals and objectives set forth in the RMP.

The BLM-administered lands within the Hollister RMP planning area are currently managed in accordance with the decisions in the 2007 Hollister RMP (BLM 2007).

One of the primary objectives of the RMP amendment planning effort is to provide a collaborative planning approach that assists the BLM in updating the

oil and gas resources management decisions of the current RMP. The final amended RMP will identify which lands are open or closed to oil and gas leasing and which stipulations would be applied on oil and gas exploration and development activities in order to protect environmental resources.

To support the RMP amendment preparation, the BLM will prepare an EIS that provides a comprehensive evaluation of the environmental issues and impacts associated with oil and gas exploration and development, including unconventional reservoirs and well stimulation techniques. Stimulation, with respect to petroleum production, refers to a range of techniques designed to increase the permeability of the rocks through which oil flows, thereby increasing the production of oil from the reservoir. An oil reservoir is considered to be unconventional if some type of well stimulation is required to make production economically feasible. This stimulation can include techniques that increase reservoir permeability to increase the rate of oil flow from the reservoir to the well. NEPA requires the BLM to consider a range of alternatives in its planning process and to analyze and disclose the potential environmental impacts of proposed RMP amendment decisions. The alternatives and impact analyses are documented in the EIS. The EIS process also provides opportunities for participation by the public, other federal, state, and local agencies, and tribal individuals and organizations in the RMP amendment development. The RMP amendment and EIS will be combined into one document.

1.2 Preliminary Purpose of and Need for the Resource Management Plan Amendment

The purpose of this planning process is to analyze the effects of alternative oil and gas management approaches on lands with federal mineral estate within the HFO. The need for the RMP amendment is to incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends to update the reasonably foreseeable development scenario (RFD) and Hollister RMP.

1.3 Description of the RMP Amendment Planning Area

The proposed planning area is the Hollister Field Office boundary, which encompasses 6,815,100 acres across twelve counties in western-central California (**Figure 1-1,** Hollister Field Office RMP Amendment Planning Area). The proposed planning area includes federal, state, and private lands.

The actual decision area for the EIS is where federal mineral interests exist. The decision area is only the surface land and subsurface mineral estate within the planning area for which the BLM has authority to make minerals management decisions.

If the planning area were limited to the HFO, the decision area would be composed of 270,000 acres of subsurface mineral estate underlying federal

surface land and 588,000 acres of subsurface mineral estate underlying privately owned land, otherwise referred to as "split estate" lands.

On-going oil and gas development is occurring in the HFO. Most of the production comes from the oil fields near Coalinga and the Jacalitos Valley in the San Joaquin Management Area. Additionally, the San Ardo and associated oil fields are located within the Salinas Management Area; however, the BLM administers few of the lands in this area. Likewise, the Vallecitos oil fields are in the San Benito Management Area; little of the production takes place on BLM-administered lands. Exploratory oil wells have historically been drilled on less than five percent of the leases issued on BLM-administered lands.

As of mid-2014, there are 71 oil and gas leases on federal mineral estate within the HFO covering about 44,243 acres. Approximately 35 to 40 percent of the leases cover BLM-administered surface. The remainder cover split-estate lands. There are 146 total wells on BLM oil and gas leases, including 80 producing oil and gas wells and service wells and 66 idle wells; this is the total number of wells on federal mineral estate, including wells on both federal surface and split-estate lands. There are an additional 4,293 wells on non-federal mineral estate. The BLM is involved in approximately 3.4 percent of all current oil and gas activity within the HFO boundary.

1.3.1 Geographic Scope

The preliminary planning area for this RMP Amendment/EIS was identified during scoping as the HFO. The BLM noted in the *Federal Register* and in the scoping materials that the BLM welcomed feedback from the public on a broader geographic scope. The decision about the final geographic scope of the EIS will be based on public comments received during scoping and on the results of the ISA. This report focuses primarily on the preliminary planning area; however, if the geographic scope increases, the BLM would conduct additional public outreach.

1.4 Overview of the Public Involvement Process

Public involvement is a vital and legal component of both the RMP and EIS processes. Public involvement vests the public in the decision-making process and allows for full environmental disclosure. Guidance for implementing public involvement under the National Environmental Policy Act (NEPA) is codified in 40 Code of Federal Regulations (CFR) Section 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on public lands. Guidance for implementing public involvement during land use planning actions on public lands can be found in the BLM Land Use Planning Handbook H-1601-1 (BLM 2005) and BLM NEPA Handbook H-1790-1 (BLM 2008). Public involvement requirements of both NEPA and FLPMA will be satisfied through this joint RMP Amendment/EIS process.

Hollister Field Office RMP Amendment Planning Area

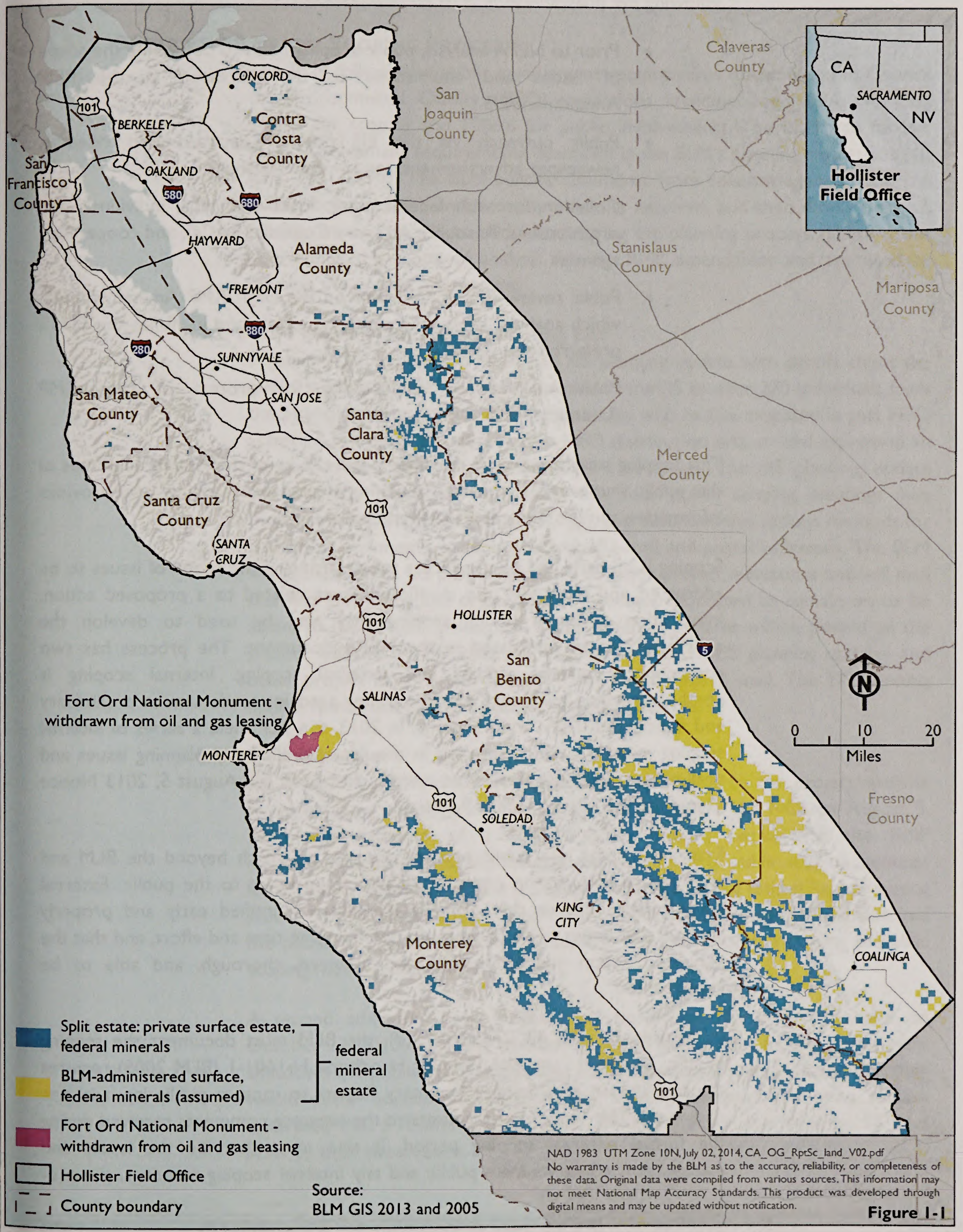


Figure 1-1

Public involvement for the RMP Amendment/EIS is being conducted in the following five phases:

- Prior to NEPA analysis, public scoping helps to determine the scope of issues and alternatives to be addressed in the RMP Amendment/EIS
- Public outreach via the EIS planning update, news releases, newspaper advertisements, and website postings
- Collaboration with federal, state, local, and tribal individuals and organizations; Resource Advisory Councils (RACs); and cooperating agencies
- Public review of and comment on the Draft RMP Amendment/EIS, which analyzes likely environmental effects and identifies the BLM's preferred alternative
- Public review and opportunity for protest of Final RMP Amendment/EIS

This scoping summary report documents the results of the first three phases of the public involvement process, beginning with public scoping, and provides information about the ongoing collaboration process.

Scoping is an early and open process for determining the scope of issues to be addressed and identifying the significant issues related to a proposed action. Information collected during scoping may also be used to develop the alternatives to be addressed in the NEPA document. The process has two components: internal scoping and external scoping. Internal scoping is conducted within an agency or cooperating agencies to determine preliminary and anticipated issues and concerns. In 2013, the BLM held a series of internal scoping meetings, which resulted in the list of preliminary planning issues and preliminary planning criteria that were published in the August 5, 2013 Notice of Intent (NOI) in the *Federal Register*.

External scoping is a public process designed to reach beyond the BLM and attempts to identify the concerns of high importance to the public. External scoping helps ensure that planning issues are identified early and properly studied, that issues of no concern do not consume time and effort, and that the proposed action and alternatives are balanced, thorough, and able to be implemented.

In accordance with 43 CFR 1610.2(d), the BLM must document the scoping results. The BLM Land Use Planning Handbook H-1601-1 (BLM 2005) requires the preparation of a Scoping Summary Report to capture public input in one document. This report must summarize the separate comments received during the formal external scoping period. It also must describe the issues and management concerns from public and any internal scoping meetings, the pre-

plan analysis, and must include a discussion of how these comments will be incorporated into the RMP amendment.

1.5 Description of the Scoping Process

The BLM follows the public involvement requirements documented in Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1501.7 for scoping and 1506.6 for public involvement). The BLM also follows public involvement requirements described in the BLM's planning regulations (43 CFR 1601-1610). The BLM solicits comments from relevant agencies and the public, organizes and analyzes all comments received, and then distills them to identify issues that will be addressed during the planning process. These issues help define the scope of analysis for the RMP amendment and are used to develop the project alternatives.

1.5.1 EIS Planning Update and Mailing List

In January 2014, the BLM mailed an EIS planning update with details about the public scoping period for the RMP Amendment/EIS to over 270 individuals from the public, agencies, tribes, and organizations who had participated in past HFO activities, had been included on past HFO distribution lists, or had expressed an interest in BLM oil and gas management decisions. The EIS planning update provided the dates and venues for the four public scoping meetings (see **Section 1.4.4**, Scoping Public Meetings), and described the various methods for submitting comments, including dedicated e-mail and postal addresses. The BLM will publish future EIS planning updates at major project milestones and will mail them to individuals and organizations that have requested to remain on or be added to the project mailing list. All EIS planning updates will be posted on the project website. Participants may request to receive EIS planning updates and other project information through electronic or postal mail. The EIS planning update is included in **Appendix A**, Scoping Materials.

1.5.2 News Release

On August 2, 2013, the BLM posted a news release to the project website (www.blm.gov/ca/eis-og) announcing the publication of the NOI on August 5, 2013, the initiation of a 60-day public scoping period for the RMP Amendment/EIS process, and the tentative scheduling of public scoping meetings for fall 2013. The news release indicated that an additional *Federal Register* notice would be published 15 days prior to the public scoping meetings and directed the public to check the project website in the future for the posting of public scoping meeting dates and locations.

A second additional news release was posted to the project website on October 23, 2013, indicating that due to the October 2013 federal government shutdown the public scoping meetings had not yet been scheduled and that they would occur beyond the initial 60-day scoping window. The news release reiterated that a *Federal Register* notice would announce the meetings 15 days prior to their occurrence.

A third news release was posted to the project website on January 13, 2014, providing dates, times, and locations of the four public scoping meetings. The news release also indicated that depending on the results of the scoping process, the geographic scope of the project may be expanded beyond the HFO.

A fourth news release was posted to the project website on February 4, 2014 highlighting the remaining two scoping meetings that had yet to occur as of that posting date.

The BLM also provided information on the scoping public meetings on the project website (see **Section 1.4.4**, Scoping Public Meetings) and described the various methods for submitting comments.

1.5.3 Project Website

A public website was launched and is regularly updated to provide the public with the latest information about the RMP Amendment/EIS process. The project website (www.blm.gov/ca/eis-og), provides the following:

- Background information about the project
- Citizen's Guide to NEPA
- *Federal Register* NOI
- EIS planning update
- All public scoping meeting handouts and posters, as well as the scoping meeting PowerPoint presentation
- All news releases posted since August 2013
- Scoping comment form
- BLM proposed hydraulic fracturing rule

1.5.4 Scoping Public Meetings

The BLM hosted four public meetings to provide the public with opportunities to become involved, learn about the project and the planning process, meet the Hollister RMP Amendment team members, and offer comments. The NOI announced the BLM would hold local public scoping meetings. The dates, meeting locations and times, and instructions for providing comments were announced via a January 2014 news release and the EIS planning update. The details of the public meetings are provided in **Table 1-1,** Public Scoping Meetings.

Table 1-1
Public Scoping Meetings

Location (California)	Venue	Date	Number of Attendees	Number of Completed Comment Forms Received
Hollister	San Juan Oaks Golf Course	1/29/2014	29	4
Sacramento	Doubletree Hotel	2/04/2014	35	2
Salinas	Cesar Chavez Library	2/11/2014	21	1
Coalinga	Harris Ranch Inn & Restaurant	2/12/2014	5	0
Total			**90**	**7**

Note: Meetings were from 6 PM to 8 PM.

Scoping meetings were held to encourage participants to discuss concerns and questions with BLM staff representatives. Copies of the first issue of the EIS planning update, a glossary of terms, blank scoping comment forms, and a guide to providing substantive comments were available at the sign-in station. A Microsoft PowerPoint presentation was given by a contractor representing the BLM and was followed by an opportunity for attendees to speak for up to three minutes each. BLM personnel were present after the public speaking time to discuss issues with attendees one-on-one and in small groups. Several poster maps were displayed around the room to illustrate the HFO, the presence of mineral estate and split estate, estimates of oil and gas potential, special land designations, air basins, and water resources. Current stipulations on oil and gas leases within the HFO were also shown. All handouts and poster maps were also posted on the RMP amendment website for public review. As shown in **Table 1-1,** Public Scoping Meetings, 90 people attended the public meetings.

Members of the public made verbal comments during the scoping meetings. This is not the official way of commenting, and attendees were encouraged to write their comments down and to follow the formal submission process. However, for informational purposes verbal comments were noted by BLM and contractor staff at the public scoping meetings and a summary of these comments is included in **Section 2.2.1**, General Themes of Verbal Comments at Scoping Meetings and **Appendix D,** Verbal Comments from Scoping Meetings.

1.5.5 Notice of Intent

The NOI is the legal document notifying the public of the BLM's intent to initiate the planning process and to prepare an EIS for a major federal action. The NOI invites the participation of affected and interested agencies, organizations, and members of the general public in determining the scope and significant issues to be addressed in planning alternatives and analyzed in the EIS. It also initiates the formal scoping public comment period as required by NEPA,

which extended 207 days following publication of the NOI in the *Federal Register*. The NOI was published on August 5, 2013, and the official scoping comment period ended on February 28, 2014. Comments received on or before February 28, 2014 are included in this report. The BLM will consider all comments received during the planning process, both before the publication of the NOI and after the end of the official scoping comment period. A link to the NOI is posted on the project website (www.blm.gov/ca/eis-og) and can also be found in Appendix A.

1.6 Collaborative Involvement Process

In addition to formal scoping, the BLM has implemented a collaborative outreach and public involvement process that will include working closely with cooperating agencies. These efforts are summarized below. The BLM will continue to meet with interested agencies and organizations throughout the planning process, as appropriate, and will coordinate closely with cooperating partners.

1.6.1 Cooperating Agencies

A cooperating agency is any federal, state, or local government agency or Indian tribe that enters into a formal agreement with the lead federal agency to help develop an environmental analysis. More specifically, cooperating agencies "work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks" (BLM 2005). The benefits of enhanced collaboration among agencies in preparing NEPA analyses include the following:

- Disclosing relevant information early in the analytical process
- Obtaining relevant information from local communities, including social conditions
- Applying available technical expertise and staff support
- Avoiding duplication with other federal, state, tribal, and local procedures
- Establishing a mechanism for addressing intergovernmental issues

On January 15, 2014, the BLM wrote to 35 local, state, and federal agency or government representatives, inviting them to participate as cooperating agencies for the HFO Oil and Gas Leasing and Development RMP amendment and EIS. All appropriate parties to the Air Quality Memorandum of Understanding (as revised in 2011) were included in the invitation list. These parties included the following:

- BLM
- US Fish and Wildlife Service
- US National Parks Service

- US Forest Service
- US Environmental Protection Agency

The BLM will develop a Memoranda of Understanding with the agencies accepted into cooperating status. As of March 7, 2014, no agencies have requested to participate in the RMP Amendment/EIS process as designated cooperating agencies. The list of invited agencies included the following:

- Alameda Planning Department
- Bay Area Air Quality Management District
- California Department of Conservation
- California Department of Fish and Wildlife
- California Division of Oil, Gas and Geothermal Resources
- California Geological Survey
- California Natural Resources Agency
- California Office of Historic Preservation
- California State Air Resource Control Board
- Central Coast Regional Water Quality Control Board
- Central Valley Regional Water Quality Control Board - Fresno Office
- Central Valley Regional Water Quality Control Board - Sacramento Office
- Contra Costa County Planning Commission
- County of Monterey
- County of San Mateo
- Department of Toxic Substances Control
- Fresno County
- Lawrence Berkeley National Laboratory
- Los Padres National Forest
- Merced County
- Monterey Bay Unified Air Pollution Control District
- National Park Service
- San Benito County
- San Francisco Bay Regional Water Quality Control Board
- San Joaquin County Community Development Department

- San Joaquin Valley Air Pollution Control District (Central Office)
- Santa Clara County
- Santa Cruz County
- Stanislaus County
- State Water Resources Control Board
- US Army
- US Bureau of Reclamation
- US Environmental Protection Agency (EPA), Region 9
- US Fish and Wildlife Service
- US Geological Survey

The BLM anticipates up to 10 cooperating agency meetings (more if warranted) throughout the RMP amendment and EIS process. Invited cooperating agencies were also encouraged to attend the scoping meetings and provide comments during the scoping period. Cooperating agencies will be engaged throughout the planning process, including during alternatives development.

1.6.2 Outreach and Coordination with Tribes

The BLM has initiated Section 106 consultation with the 28 tribal individuals, organizations, and federally recognized tribes identified as having interests in the planning area. Consultation conducted as required by the National Historic Preservation Act and Executive Order 13007 "Indian Sacred Sites." During scoping, the first EIS update was mailed to 28 tribal individuals and organizations. Consultation efforts also included the distribution of consultation letters mailed to 28 tribal entities on January 15, 2014. In some cases a letter was sent to multiple individuals belonging to the same tribal organization:

- Amah Mutsun Ohlone
- Amah Mutsun Tribal Band
- Mr. Andrew Galvan
- California Valley Miwok Tribe
- Costanoan Rumsen Carmel Tribe
- Esselen Tribe of Monterey County
- Indian Canyon
- Ms. Jakki Kehl
- Ms. Judith Bomar Grindstaff
- Ms. Katherine Erolinda Perez
- Ms. Linda Yamane

- Muwekma Ohlone Tribe
- Ohlone-Costanoan Esselen Nation
- Pajaro Valley Ohlone Indian Council
- Mr. Richard Larios
- Salinan Nation Cultural Preservation Association
- Salinan Tribe
- Salinan Tribe of Monterey, San Luis Obispo and San Benito Counties
- Salinan-Chumash Nation
- Santa Rosa Rancheria of Tachi Yokuts
- Trina Marina Ruano Family
- Xolon Salinan Tribe

Of the tribes contacted, the Ohlone/Costanoan-Esselen Nation responded with a letter indicating a desire for consultation on any planned projects that may adversely impact known or predicted cultural resources and sacred sites within the tribe's aboriginal territory.

No other written comments were received from tribal agencies during the scoping period. Government-to-government consultation will continue throughout the RMP amendment process to ensure that the concerns of tribal groups are considered in development of the RMP amendment.

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SECTION 2
COMMENT SUMMARY

2.1 METHOD OF COMMENT COLLECTION AND ANALYSIS

All written submissions received on or before February 28, 2014 were evaluated and are documented in this Scoping Summary Report. All comments received during the RMP amendment process will be considered in alternatives formulation and project planning.

A total of 132 unique written submissions, resulting in 734 unique comments, were received during the public scoping period. The most common format used for submissions was e-mail. Submissions were also mailed by US Mail to the BLM. In addition, comment forms were completed at the public scoping meetings.

Included in the 132 unique submissions is one letter received from the non-governmental organization CREDO that included 10,577 electronic signatures by its members. Also included in the 132 unique submissions was a form letter received by three individuals not associated with any particular organization. This letter was counted as three unique submissions. Details of those form letters are included in **Appendix B**, List of Commenters, **Table B-2**, Form Letter Submissions. Some CREDO members added unique comments to that form letter. When unique comments were added to the form letter, those comments were entered into the comment-tracking database.

A list of commenters and the dates of submittal are provided in **Appendix B**, List of Commenters. Most written submissions included more than one comment, and in many cases individual comments addressed more than one planning process topic or resource category. Where an individual comment addressed more than one process topic or resource category, that comment was counted more than once and was categorized under each applicable category. The 132 submissions yielded 734 uniquely categorizable comments.

To ensure that public comments were properly registered and that none were overlooked, a multi-phase management and tracking system was used. First, written submissions were logged and numbered. Once all comments were received and documented, the BLM assigned a planning process category code to each issue raised in the scoping comments. These codes detail which issues raised in the scoping comments will be resolved through this RMP amendment planning effort. Process category codes include the following:

1: Scoping issues that will be addressed in the RMP amendment

2: Scoping issues that will be addressed through BLM policy or administrative action (National and BLM policy) rather than through this RMP amendment

3: Scoping issues that are beyond the scope of this RMP amendment that will be considered but not addressed

To assist with the analysis, the BLM entered comments into the Public Input and Comment Tracking database and organized comments by planning issue categories and affiliation of the commenter. Finally, these identifiers were queried and tallied to provide information on planning and other issue categories. Details of comments received by planning issue are included in **Section 2.2.4**, Number of Comments by Planning Process Category.

2.2 Summary of Public Comments Received

2.2.1 General Themes of Verbal Comments at Scoping Meetings

At each of the four public scoping meetings, attendees were invited to speak after the BLM presentation. The following number of attendees elected to speak at the meetings:

- Hollister – 13 speakers
- Sacramento – 15 speakers
- Salinas – 12 speakers
- Coalinga – 1 speaker

At each of the four meetings, a representative from the Western States Petroleum Association spoke, representing the socioeconomic benefits and safety features of current oil and gas exploration technologies. At the Hollister and Salinas meetings there were a few additional speakers who supported oil and gas leasing on public lands for the economic stimulatory effects that such an action would have on local communities. One of these speakers expressed concern that the BLM would make decisions based on popular opinion and urged the agency to make science-based decisions. Speakers in support of oil and gas leasing urged the BLM to conduct the EIS quickly, to keep the scope of the analysis narrowly focused on oil and gas leasing changes since the 2007 RMP, and offered informational sources for the BLM to use in preparing the EIS.

The remaining speakers offered a variety of comments generally expressing opposition to hydraulic fracturing on any federal mineral estate in California. Concerns were expressed regarding water use and water contamination, with frequent references made to the current historic drought. The role of fossil fuel extraction and combustion on climate change was a frequently raised topic. Speakers also raised concerns about air quality, induced seismicity, impacts on farming, accident scenarios, data sources for the EIS, and impacts on historic sites and cultural resources. A few speakers encouraged the BLM to coordinate with other agencies.

A detailed list of spoken comments is provided in **Appendix D**, Verbal Comments from Scoping Meetings.

2.2.2 Written Submissions by Affiliation

Table 2-1, Comments by Commenter Affiliation[1], and **Figure 2-1**, Comments by Commenter Affiliation[1], show the number and proportion of written submissions received from each type of affiliation. Letters on business, agency, or organization letterhead, or where the commenter signed using their official agency title, were considered to represent that organization. All other letters were considered to represent individuals. Members of the general public provided 110 of the comments (83.3 percent) received during the scoping period, representatives from businesses submitted 2 of the comments (1.5 percent), and non-profit or citizen groups submitted 13 of the comments (9.8 percent).

Federal agencies submitted 2 written submissions (1.5 percent), local government agencies submitted 4 written submissions (3.0 percent), and a tribal organization submitted 1 written submission (0.8 percent). No written submissions were received from elected officials, anonymous commenters, educational organizations, or state agencies. A list of commenters, their affiliations, and the submittal date of their comments is included as **Appendix B**, List of Commenters.

2.2.3 Written Submissions by Geographical Area

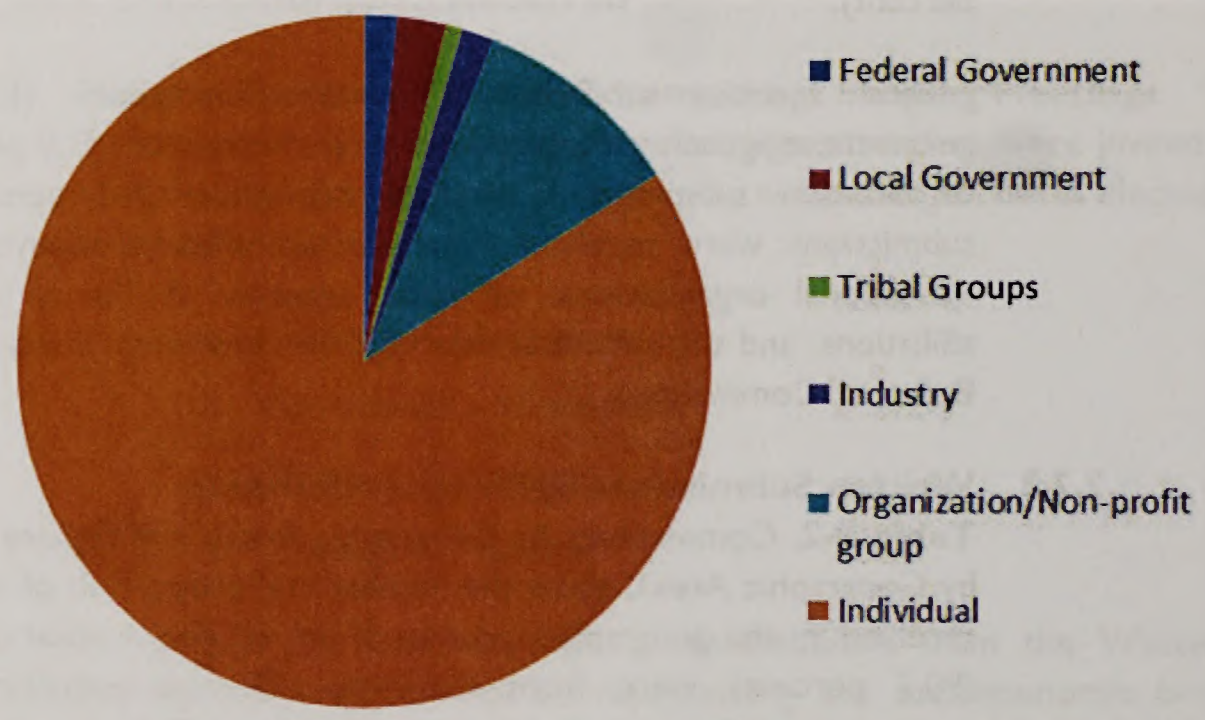
Table 2-2, Commenters by Geographic Area[1], and **Figure 2-2**, Commenters by Geographic Area1, show the number and proportion of written submissions received by the geographic location of the sender. A total of 117 commenters (90.7 percent) were from California. Of the remaining submissions, 1 commenter (0.8 percent) was from outside of California, and 11 commenters (8.5 percent) did not indicate a geographic origin. Note that these calculations do not include the CREDO form letter commenters, unless those commenters added unique comments to their form letter submissions. In addition, some commenters made multiple submissions and some letters had more than one signatory; therefore, the total for commenters by geographic area is not equal to the total letter submissions.

Table 2-1
Comments by Commenter Affiliation[1]

Affiliation	Number of Comment Letters	Percentage of Total Comment Letters[2]
Government	6	4.5
Federal	*2*	*1.5*
State	*0*	*0*
Local	*4*	*3.0*
Elected Official	*0*	*0*
Businesses	2	1.5
Organizations/Non-profits	13	9.8
Individuals	110	83.3
Tribal Groups	1	0.8
Total	**132**	**100**

[1]Calculations include the CREDO form letter as one submission from an organization.
[2]Total may not add up to 100 due to rounding

Figure 2-1
Comments by Commenter Affiliation[1]



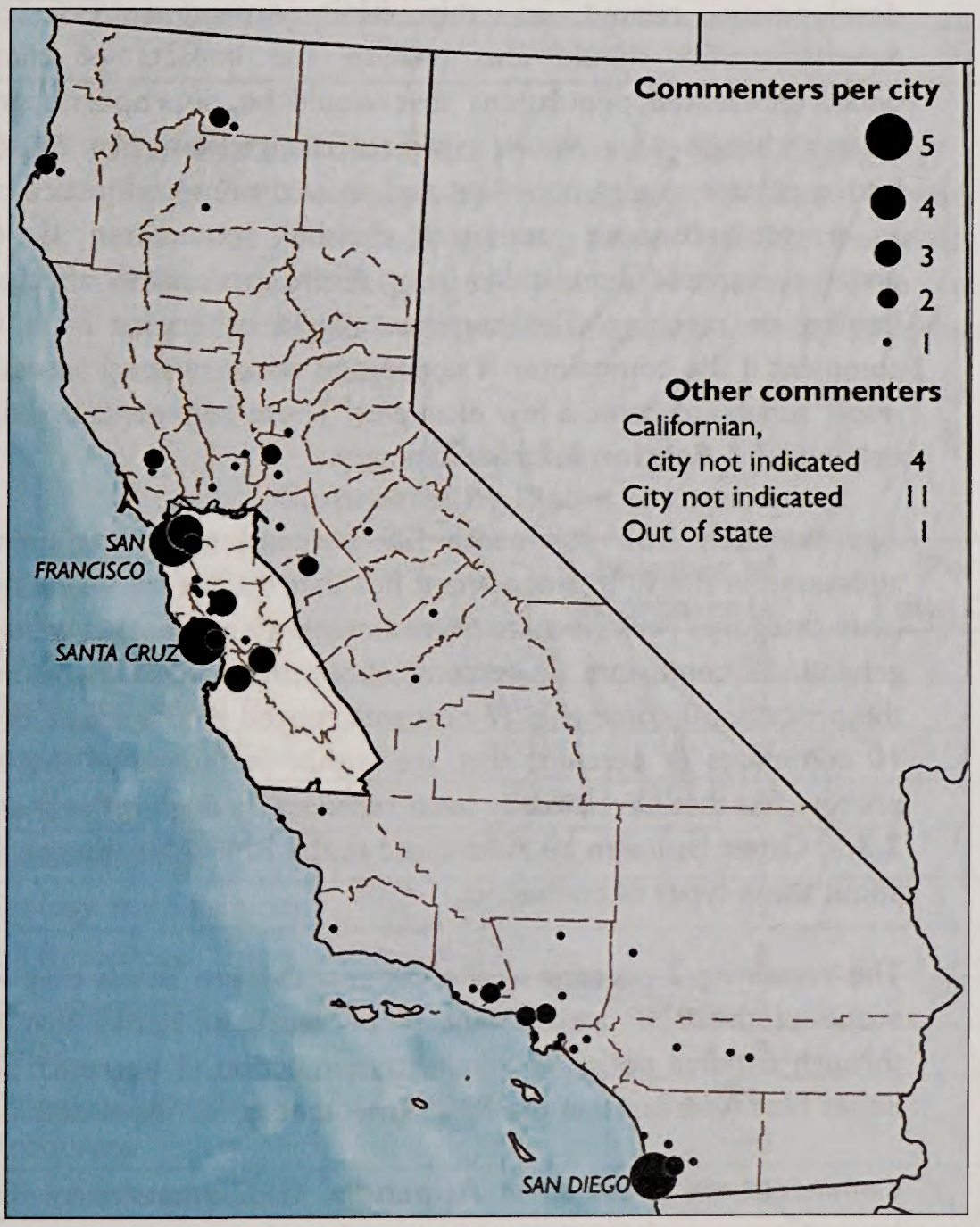
[1]Calculations include the CREDO form letter as one submission from an organization and the other form letter as three submissions from three individuals.

Table 2-2
Commenters by Geographic Area[1]

Location	Number of Commenters	Percentage of Total Commenters
Within California	117	90.7
Outside California	1	0.8
Unknown	11	8.5
Total	**129**	**100**

[1]Calculations do not include the CREDO form letters submissions unless commenter added unique comments to the submission

Figure 2-2
Commenters by Geographic Area[1]



[1]Calculations do not include the CREDO form letter submissions unless commenter added unique comments to the submission.

2.2.4 Number of Comments by Planning Process Category

Table 2-3, Comments by Planning Process Category, shows the number of comments raised during scoping. Of the 734 comments received, 541 comments (74 percent) were related to a specific planning issue that will be addressed in the RMP amendment. Some comments addressed multiple planning issues and were therefore counted more than once for analysis. For example, a commenter concerned about traffic might have concerns about the impact of oil and gas development on traffic or the impact of traffic on other resources such as on air quality, climate change, wildlife, or public health and safety. In such a situation, one comment could be classified as a concern about multiple resource issues. Many of the resources and, consequently, many of the impacts on the resources are interrelated.

Another example can be found with commenters who are concerned about the impact oil and gas development has on climate change. Along with this concern comes the concern that, if climate change is exacerbated by oil and gas development related to this RMP Amendment/EIS, then the RMP Amendment/EIS should also analyze the impacts of climate change on underrepresented populations that would be disproportionately impacted by climate change. As a result, a climate change comment could be classified as both a climate change comment and an environmental justice comment, as well as a socioeconomic comment if the commenter is concerned with underrepresented populations being disproportionately affected by impacts on farming or ranching. The comment could otherwise be a water resources comment if the commenter is concerned about unequal access to a diminishing water supply, to name a few examples. These comments are discussed in detail below and in **Section 3**, Issue Summary.

Approximately 182 comments (25 percent) were comments that will be addressed in the RMP amendment but that do not fall within a specific planning issue category. These include 69 comments (9 percent) related to the project in general, 53 comments (7 percent) about alternatives to be considered during the process, 50 comments (7 percent) related to the scope of the project, and 10 comments (1 percent) that are within the scope of the RMP amendment process but that have already been resolved through other means. See **Section 3.3.7**, Other Issues to be Addressed in the RMP Amendment, for further detail about these types of comments.

The remaining 2 percent of the comments were issues that were beyond the scope of the RMP amendment (1 percent), or issues that will be resolved through national policy or administrative action (1 percent). See **Section 3.4**, Issues Not Addressed in the RMP Amendment, for more detail.

Comments are provided in **Appendix C**, Comments by Resource Planning Issue. Comment letters can be viewed in their entirety at the BLM California State Office in Sacramento.

Table 2-3
Comments by Planning Process Category

Process Category	Number of Comments	Percentage of Total Comments
Issues that will be resolved in the RMP amendment	723	98
General comment related to project	*69*	*9*
Planning issue	*541*	*74*
Alternatives	*53*	*7*
Scope of the EIS	*50*	*7*
Inside scope, addressed under existing policies, plans, and legislation	*10*	*1*
General issue beyond the scope of the RMP	4	1
Issue resolved through national policy or administrative action	7	1
Total	**734**	**100**

2.2.5 Number of Comments by Planning Issue Category

Table 2-4, Comments by Planning Issue, shows the number and percentage of comments received by planning issue. The BLM received 541 planning issue comments and categorized them into 14 planning issue categories. **Section 3**, Issue Summary, provides a detailed analysis of the comments received for each planning issue category.

Table 2-4
Comments by Planning Issue

Planning Issue	Number of Comments	Percentage of Total Comments
Issue 1. Water Resources	138	26%
Issue 2. Health and Safety	104	19%
Issue 3. Vegetation and Wildlife	53	10%
Issue 4. Air Quality	68	13%
Issue 5. Climate Change	47	9%
Issue 6. Geology and Seismicity	55	10%
Issue 7. Soil Resources	8	1%
Issue 8: Socioeconomics	25	5%
Issue 9. Traffic	5	1%
Issue 10. Tribal and Cultural Resources	10	2%
Issue 10. Environmental Justice	14	3%
Issue 12. Land Use	5	1%
Issue 13. Livestock Grazing	1	0%

Table 2-4
Comments by Planning Issue

Planning Issue	Number of Comments	Percentage of Total Comments
Issue 14. Recreation	4	1%
Issue 15. Visual Resources	4	1%
Total	**541**	**100%**

Of the planning issue categories, the highest number of comments (138 comments and 26 percent of total comments) were about water resources. Health and safety was the category that received the next highest number of comments (104 comments and 19 percent), followed by air quality (68 comments and 13 percent), geology and seismicity (55 comments and 10 percent), vegetation and wildlife (53 comments and 10 percent), climate change (47 comments and 9 percent), socioeconomics (25 comments and 5 percent), environmental justice (14 comments and 3 percent), tribal and cultural resources (10 comments and 2 percent), soil resources (8 comments and 1 percent), traffic (5 comments and 1 percent), land use (5 comments and 1 percent), recreation (4 comments and 1 percent), visual resources (4 comments and 1 percent), and livestock grazing (1 comment and less than 1 percent).

SECTION 3
ISSUE SUMMARY

Issue identification is the first step of the nine-step BLM planning process. As defined in the BLM Land Use Planning Handbook H-1601-1 (BLM 2005), planning issues include concerns or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices. Issues include concerns, needs, and opportunities for resource use, development, and protection to consider in amending RMPs. These issues may stem from new information, changed circumstances, or from the need to reassess the appropriate mix of allowable uses.

3.1 PLANNING ISSUE DEVELOPMENT

The BLM enacted a two-step issue identification process for the RMP Amendment/EIS planning effort, starting with internal BLM scoping meetings in 2013 and finishing with public scoping that ended in February 2014.

Preliminary planning issues identified through internal meetings were included in the August 5, 2013 NOI in the *Federal Register*. The NOI initiated the formal scoping period, as required by NEPA, and solicited written comments from the public (further discussed in **Section 1.4**, Description of the Scoping Process). Public outreach for scoping continued with the release of the first EIS planning update in January 2014, followed by scoping meetings in January and February 2014. Scoping is a collaborative public involvement process implemented to identify and refine planning issues to address in the planning process. During the scoping period, the BLM also engaged cooperating agencies, as discussed in **Section 1.5**, Collaborative Involvement Process. Formal tribal consultation also began during the scoping period. During scoping, tribal individuals and organizations were sent the EIS planning update as well as individual letters offering government-to-government consultation. The BLM hosted four public meetings and solicited written comments from the public during the scoping period. The scoping period provided the BLM with additional information on the

public's concerns and suggestions regarding issues of concern for the RMP amendment.

Information accepted during internal and external scoping was compiled to develop discrete planning issue statements; these are discussed in **Section 3.2**, Planning Issue Statements. The purpose of these planning issue statements is to highlight the key issues distilled from these initial planning and scoping processes. The issues are also discussed in **Section 3.3**, Summary of Public Comments by Resource Planning Issue Category, according to the various issue categories and associated comments received from interested individuals, agencies, elected officials, businesses, tribes, and organizations. The BLM will use the planning issues and associated statements, planning criteria, and other information collected in the early planning and scoping phases of the RMP amendment process to help formulate a reasonable range of alternative management strategies that will be analyzed during the RMP Amendment/EIS process.

3.2 Planning Issue Statements

A planning issue is a conflict or dispute over resource management activities, allocations, or land use that is well defined or topically discrete and entails alternatives between which to choose. Fifteen planning issue categories were developed during the scoping period, with a planning issue statement developed for each category.

The planning issue statements presented below are based on the best information gathered to date. These issues will be presented as questions that will be addressed through the RMP amendment. The process of developing this RMP amendment will afford many opportunities for collaboration with local, state, and federal agencies and tribal governments; land management agencies; public interest groups; and public land users. As a result, these issues and concerns may need to be modified and refined to reflect public comments and concerns. The majority of the comments received focused particularly on well stimulation techniques associated with unconventional oil reservoirs in California. These techniques include hydraulic fracturing and acidization, which can include either acid fracturing or matrix acidizing. Therefore, many of the issue statements below focus on the impacts of these processes.

Some of the overarching planning issues the BLM will address are listed below. Each overarching issue, in turn, has several sub-topics, issue questions, and management concerns that address more specific uses and resources. As applicable, items listed in Appendix C of the Land Use Planning Handbook (BLM 2005) will be addressed and decisions will be made. Planning issue statements include the following:

Issue 1: Water Resources

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on water resources? What measures will be implemented to protect these resources?

- Migration of chemicals from deep systems to aquifers
- Well casing failures
- Leaks, spills, pipeline failures, train derailments
- Open pit leaks and infiltration
- Groundwater contamination
- Surface water contamination
- Groundwater supply reductions
- Surface water supply reductions
- Impacts on downstream stream functions and users
- Wetlands, vernal pools, springs, seeps, riparian areas
- Nexus of groundwater with surface waters
- Increased storm water runoff

Issue 2: Health and Safety

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on public and worker health and safety? What measures will be implemented to protect the public, workers, and sensitive receptors??

- Valley Fever
- Inhalation of emissions of workers and local communities
- Spills and other accidents
- Water supply contamination
- Air quality degradation and hazardous air pollutants
- Carcinogenic and endocrine-disrupting effects of chemicals
- On-site wastewater treatment facilities
- Closed loop systems
- Radioactive elements
- Noise and light pollution
- Increased traffic and accident risks
- Need for thorough risk assessment

Issue 3: Vegetation and Wildlife

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on plants and wildlife? What measures will be implemented to protect these resources?

- Dispersion and persistence of chemicals into environment
- Biomagnification (concerns about toxins, heavy metals, and other substances moving up through the food chain)
- West Nile virus from mosquitos in sumps
- Invasive species introduction, including aquatic
- Effects of spills and intentional dumping of wastewater on aquatic species and riparian vegetation
- Subterranean microbial diversity in shale formations
- Effects on condors from steam plumes from thermal stimulation
- Effects of noise, light, and pollution on wildlife
- Ground nesting birds avoiding tall structures (drill rigs) that attract predators
- Wildlife corridors
- US Fish and Wildlife Service recovery plans

Issue 4: Air Quality

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, e on air quality? What measures will be implemented to protect air quality?

- Evaporation and assisted evaporation from open pits
- Emissions from closed loop systems
- Emissions from oilfield operations
- Flaring, venting
- Truck traffic along travel routes
- Presence of hazardous air pollutants in hydraulic fracturing mixtures
- Pollution from eventual combustion of extracted fossil fuels
- Impacts on air quality related values assessed through the use of quantitative modeling

Issue 5: Climate Change

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on climate change and federal efforts to minimize climate change? What measures will be implemented to minimize contributions to and the impacts of climate change?

- Relationship between drought, climate change, greenhouse gases, fossil fuel combustion, and fossil fuel extraction
- Consistency with federal government goals for carbon sequestration
- Role of public lands in carbon sequestration and groundwater recharge

Issue 6: Geology and Seismicity

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on geology and induced seismicity? What measures will be implemented to protect geology and mitigate for induced seismicity?

- Induced seismicity from disposal wells
- Seismic effects on nearby lakes, dams, and reservoirs

Issue 7: Soil Resources

Issue Statement: What would the be impact of different approaches to oil and gas management, including well stimulation activities, on soil resources? What measures will be implemented to protect soil resources?

- Open pits and soil contamination
- Closed loop systems and soil contamination
- Spills and accidents and soil contamination
- Erosion, sedimentation, subsidence

Issue 8: Socioeconomics

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on the social values and economic revenues of the community? What measures will be implemented to protect these values and revenue sources?

- Water quality and volume available for farming
- Costs of accidents and spills
- Influx of workers to rural towns: schools, housing
- Loss of scenic beauty and changes to tourism
- Climate change
- Economic stimulation of local and regional economies

Issue 9: Traffic

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on traffic and local roads? What measures will be implemented to protect local roads and manage increased traffic?

- Heavy truck use of local residential roads
- Changes in traffic patterns
- Spills and accidents

Issue 10: Tribal and Cultural Resources

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on tribal and cultural resources? What measures will be implemented to protect these resources?

- Light, noise, and scenic changes affecting Juan Bautista de Anza National Historic Trail
- Disturbance of Native American burials
- Protection of Indian sacred sites

Issue 11: Environmental Justice

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on poor, minority, and underrepresented communities? What measures will be implemented to protect these communities from experiencing disproportionate negative effects from oil and gas development?

- Farm and ranch workers
- Water and air quality impacts on sensitive receptors from oil and gas development
- Connection between oil and gas development and climate change, and the disproportionate impacts of climate change on poor, minority, and underrepresented communities
- Development occurring in communities already overburdened with oil and gas development and other forms of pollution

Issue 12: Land Use

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing land uses? What measures will be implemented to protect existing land uses?

- Wildlife habitat
- Scenic viewsheds
- Streams and springs
- Impacts on private surface owners on split-estate lands

Issue 13: Livestock Grazing

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing livestock

grazing operations? What measures will be implemented to protect these operations?

- Water supply for livestock

Issue 14: Recreation

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visitor experience and the safety of existing lands and water bodies used for recreation? What measures will be implemented to protect recreational resources?

- Access
- Visitor experience (e.g., viewshed, noise, and smell)
- Visitor safety
- National Historic Trails and National Parks

Issue 15: Visual Resources

Issue Statement: What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visual resources? What measures will be implemented to protect these resources?

- Light pollution
- Pinnacles National Park
- Juan Bautista de Anza National Historic Trail

3.3 Summary of Public Comments by Resource Planning Issue Category

As described previously, each comment received during public scoping was reviewed and coded. Comments were coded once for each category to which they applied, and therefore some comments were coded multiple times. Of the 734 comments received, 541 comments (74 percent) were related to one of the planning issues defined above. In addition, 69 comments (9 percent) were general comments related to issues that will be addressed in the RMP amendment but do not fall within a specific planning issue category. See **Table 2-4**, Comments by Planning Issue, for a breakdown of the number of comments received for each planning issue.

Summaries of the scoping comments received for each planning issue category, as well as general RMP comments, are provided in **Sections 3.3.1**, Planning Issues to be Addressed in the RMP Amendment and **3.3.2**, Other Issues to be Addressed in the RMP Amendment. These summaries provide details only on comments related to issues that will be resolved in the RMP Amendment. Tables with all comments for each planning issue, as well as tables for issues that will not be addressed in the RMP Amendment, are included in **Appendix C**, Comments by Resource Planning Issue. Adjustments or additions may be made to the planning issues as the planning process proceeds and the BLM continues

to review information, meet with the interdisciplinary team, and talk with the public.

3.3.1 Planning Issues to be Addressed in the RMP Amendment

Issue 1: Water Resources. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on water resources? What measures will be implemented to protect these resources?*

The BLM received 138 comments on the impacts of oil and gas development on water resources (26 percent of the planning issue comments). Most commenters expressed concern about negative impacts that hydraulic fracturing can have on the quality and supply volume of both surface and groundwater.

Concerns about groundwater contamination dominated water-related comments and most often focused on contamination related to well casing failures, long-term upward migration into aquifers from either natural or fracturing-induced cracks and fissures, leaking from open pits, and accident-induced spills related to the transportation of chemicals to project sites and petroleum and produced wastewaters away from project sites.

Commenters were also concerned about surface water contamination resulting from accident-induced spills, and the changing of surface water features such as wetlands and vernal pools due to disturbance, fill, and drawdown of local water tables. Commenters were also concerned that ground disturbance caused by oil and gas development would increase stormwater runoff, which could result in changing water flow patterns, erosion, flooding, and habitat loss.

Many commenters expressed concern about water supply during this time of historic drought in California. Commenters opposed the use of water for fossil fuel extraction at a time when water tables are at historic lows and when there is already not enough water to allocate to farming and to streamflows to support special status fish species. Commenters also drew connections between the drought and to global climate change as a potential causative factor, and expressed that by promoting more fossil fuel extraction, conditions are being set up for exacerbated drought conditions in the future. Commenters noted that unlike agricultural uses, water used for hydraulic fracturing is not returned to the landscape because it is contaminated and thereby unusable, and is either transported offsite or injected at depths below the existing water table. Commenters further tied the risk of water contamination to water supply, highlighting that any contamination of existing drinking or irrigation water supplies will render those supplies unusable.

Commenters requested that the BLM require Water Resource Management Plans prior to approving any project. Commenters

requested that a geologic analysis be performed to identify areas with faults that could facilitate the transfer of fluids from hydraulic fracturing zones upwards into aquifers, and that leasing decisions should be based in part on the results of such an analysis. Commenters requested that the EIS include analysis of long-term studies on the frequency and effect of fluid migration through newly created subsurface pathways. Commenters requested that the EIS analysis include data on well casing failure rates under high pressure conditions such as hydraulic fracturing. Commenters requested that studies on methane contamination of water wells near gas wells in the Utica and Marcellus shale be examined and considered in the analysis of potential impacts.

Commenters requested that the EIS include mapping of groundwater and surface water resources in the planning area as well as an identification of surface and groundwater uses in the area. This request includes identification of all source water protection areas, such as sole source aquifers, drinking water source protection zones, and municipal watersheds. Commenters requested that this mapping include the location and source identification of agricultural, domestic and public water supply wells, springs, and surface water intakes.

Commenters requested that the BLM consider buffer areas around wetlands, riparian areas, and water bodies to minimize the risk of contaminating these sensitive areas.

The EPA recommends the BLM adopt a requirement for monitoring to occur in private wells within one mile of an oil and/or gas project area to help assure mitigation measures are adequate and that water resources are being fully protected.

Commenters noted that the BLM, while not having jurisdiction over groundwater, has an independent duty to protect the ecological resources that occur on BLM-managed surface lands and that many of these resources are linked to groundwater quality and quantity through springs, seeps, pools, wetlands, and riparian areas. Commenters requested that the EIS include mapping of wetlands and waters of the US within the planning area as well as a list of best management practices that may be required to protect surface and groundwater resources and the circumstances under which the best management practices would be applied.

Commenters requested that the BLM examine potential streamflow withdrawals for use in well stimulation activities and the effects that such reductions in streamflow may have on downstream ecology, economy, agriculture, and human health, including diminished capacity for streamflows to dilute and degrade pollutants.

Issue 2: Health and Safety. *What would the be impact of different approaches to oil and gas management, including well stimulation activities, on public and worker*

health and safety? What measures will be implemented to protect the public, workers, and sensitive receptors?

The BLM received 104 comments about impacts of oil and gas development on the health and safety of workers and the public (19 percent of the planning issue comments).

Commenters expressed concern about future projects disturbing soil and stirring up the fungus that causes Valley Fever and asked that the EIS include information on how BLM will manage those risks to protect workers and the public from contracting this disease. Commenters were concerned about local resident health risks from emissions from oil and gas drilling projects, as well as potential exposures to harmful chemicals from spills during transportation of materials to and from project sites.

Commenters requested that the BLM analyze all health risks and potential routes of exposure for all chemicals likely to be introduced to the environment during well stimulation practices. Commenters suggested that the BLM utilize FracFocus as a data source for chemicals commonly used in hydraulic fracturing. These health risks should include all available research on carcinogenic and endocrine disrupting effects of chemicals known to be associated with hydraulic fracturing. Commenters requested that chemical use and possible exposure routes be analyzed for all phases of a project, including drill rig mobilization and demobilization, well drilling, well completion, well production, and equipment cleaning, maintenance, and repair. Commenters also asked that health risks associated with chemical dispersants used to clean up oil spills be addressed.

Commenters expressed concerns related to on-site chemical storage and processing, including hydrofluoric acid and on-site wastewater treatment facilities. Commenters asked that the EIS evaluate public health risks associated with air pollution on top of existing air pollution levels and that the analysis include not only the criteria pollutants but also the 25 chemicals used in hydraulic fracturing that are regulated as hazardous air pollutants.

Commenters asked that the EIS assess the amount, the type, and the potency of radioactive elements that are naturally occurring in federal minerals and evaluate the likely risks that stem from bringing such materials to the surface, as well as any appropriate mitigation. Commenters asked that the EIS address possible routes of exposure to produced wastewater, taking into consideration all possible disposal routes of such water.

Commenters asked that the EIS address impacts related to noise pollution, light pollution, the increased risk of traffic accidents, and increased seismic activity as a result of future unconventional extraction projects.

Commenters asked that the EIS address the potential for long-term fluid migration from hydraulic fracturing zones into drinking water or irrigation water aquifers and potential public health and safety effects. Commenters asked that the EIS discuss human health effects of climate change and tie climate change to the combustion and precursory extraction of fossil fuels that may be authorized in the RMP amendment.

Commenters requested that the BLM conduct a Health Impact Assessment, or equivalent study, of the aggregate impact that hydraulic fracturing and other unconventional extraction techniques will have on human health. Any such study should identify sensitive receptors in the planning area, such as children, the elderly, and the infirm, and specify the means by which impacts to these populations would be minimized.

Commenters requested that the EIS outline accident scenarios and consider what the health impacts would be if certain safety measures fail and if certain accidents occur. Commenters requested that the EIS discuss what measures would be in place to prevent accidents, and that the EIS report historic incidence rates of these accident types (e.g., instances of fracturing fluid being spilled while in transport, instances of well casing breaches, etc.). Commenters requested that the BLM prepare a Risk Assessment as a separate supporting document to the NEPA analysis and that this assessment utilize existing published data on all of the possible accident scenarios. Commenters indicated that the risk assessment would allow for the quantification of the chance of each kind of impact occurring that local communities have a right to know. Commenters noted recent disastrous pipeline failures and train derailments that have devastated communities and ecosystems. Commenters further requested that if historic accident rates are not available, the BLM must justify how such activities can be approved without a thorough risk analysis.

Issue 3: Vegetation and Wildlife. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on plants and wildlife? What measures will be implemented to protect these resources?*

The BLM received 53 comments about impacts of oil and gas development on vegetation and wildlife (about 10 percent of the planning issue comments).

Commenters were concerned about the risk of wildlife entering via land or air open pits containing toxic chemicals and not being able to escape. Commenters were also concerned about new open pits providing additional breeding habitat for mosquitos and the related proliferation of West Nile virus and its detrimental effects on wildlife.

Commenters requested that since fossil fuel extraction contributes to climate change, that the scope of the EIS analysis include global

effects of climate change on plants and wildlife. Commenters requested that the EIS discuss the dispersion and persistence in the environment of all chemicals used in well stimulation technologies and the long-term cumulative effects on plants and wildlife.

Commenters asked that the EIS address the introduction of invasive species to the landscape, including invasive aquatic species from the import of fresh waters to project sites for well stimulation. Commenters asked that the EIS address the potential for impacts on plants, wildlife, and aquatic life from streamflow reductions resulting from surface water withdrawals. Commenters requested that the analysis include potential impacts on aquatic species and riparian vegetation from accidental spills, pipeline failures, or the intentional dumping of wastewater.

Commenters asked that the EIS discuss new research and potential impacts on underground microbial diversity found in shale formations. Several commenters expressed concern about impacts to the condor through the consumption of contaminated waters and carrion, particularly after spill incidents. Commenters asked that the lists of chemicals commonly used for well stimulation be examined for bioaccumulation and biomagnification potential and that these potentials be translated into risk for the condor. Commenters asked that impacts from steam plumes several hundreds of feet high resulting from thermal stimulation techniques be evaluated for effects on condors and other wildlife.

Commenters asked that the EIS address indirect impacts from noise, light, and pollution on wildlife beyond immediate project areas and that it address how the introduction of drill rigs would result in avoidance of project areas by ground nesting birds. Commenters asked that the EIS identify wildlife corridors in the planning area, and that the BLM consider potential impacts on US Fish and Wildlife Service species recovery plans.

Commenters requested that the BLM conduct extensive biological studies that address: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations, and that these studies should consider these harms both individually and cumulatively.

Commenters provided references to several scientific studies and asked that the BLM include these data sources in the EIS analysis.

Issue 4: Air Quality. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on air quality? What measures will be implemented to protect air quality?*

The BLM received 68 comments about impacts of oil and gas development on air quality (about 13 percent of the planning issue comments).

Commenters expressed concern about existing air quality in the planning area and the exacerbation of these problems through additional fossil fuel development. Commenters requested that the EIS analyze air quality effects from all phases of potential future projects, including emissions from closed loop systems, flaring, and venting. Commenters expressed concern over fugitive dust emissions, combustion-related emissions, emissions from open pit evaporation of produced wastewaters, and emissions from chemical spills and leaks.

Commenters requested that the EIS contain an analysis of the toxics identified by the South Coast Air Quality Management District as being common chemicals used in hydraulic fracturing and that are included on the EPA's list of hazardous air pollutants. Commenters requested that the EIS include impact analysis for all chemicals included in California Health and Safety Code 44321, which includes toxic air contaminants and federal hazardous air pollutants.

Commenters requested that air modeling be conducted to understand which areas would be most affected by expanded use of unconventional extraction methods. Commenters requested that analysis be conducted on Class I and II areas and that guidance from the National Air Quality Memorandum of Understanding should be followed.

Commenters requested that the EIS air quality analysis include the full life cycle analysis of the fossil fuels that would be extracted, including their assumed end-point combustion. Commenters requested that the EIS describe all the methods by which the BLM can protect air quality.

Issue 5: Climate Change. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on climate change and federal efforts to minimize climate change? What measures will be implemented to minimize contributions to and the impacts of climate change?*

The BLM received 47 comments about impacts of oil and gas development on climate change (about 9 percent of the planning issue comments).

Commenters asked that the EIS address the relationship between greenhouse gases, climate change, the California drought, and how further combustion of fossil fuels as a result of expanded extraction in the planning area may exacerbate climate change and the current

drought. Commenters noted federal policy and funding to develop carbon sequestration technologies and that the lowest energy method of sequestering carbon is to not extract carbon-based fuels in the first place. Commenters asked that the EIS discuss the increasingly important role of public lands for precipitation infiltration during increasingly severe climate change-related drought.

Issue 6: Geology and Seismicity. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on geology and induced seismicity? What measures will be implemented to protect geology and mitigate for induced seismicity?*

The BLM received 55 comments about impacts of oil and gas development on geology, and seismicity (about 10 percent of the planning issue comments).

Commenters were concerned about induced seismicity from wastewater injection in disposal wells, as well as from hydraulic fracturing operations. Specific concerns were expressed about seismic impacts on Monterey County-operated lakes, dams, and reservoirs. Commenters were also concerned about the effects seismic activity could have on local communities and infrastructure.

Commenters requested that further studies be done to examine the link between hydraulic fracturing and seismic activity. Commenters cited a study on induced seismicity conducted by the US Geological Survey. Several commenters also expressed particular concern about the risk of increased seismic activity in California, a place already prone to earthquakes.

Issue 7: Soil Resources. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on soil resources? What measures will be implemented to protect soil resources?*

The BLM received 8 comments about impacts of oil and gas development on soil resources (about 1 percent of the planning issue comments).

Commenters expressed concerns about the contamination of soils from leaks from open pits and from tanks and trucks of produced wastewaters in closed loop systems. Commenters were also concerned about soil contamination from accidental spills of chemicals during transportation to project sites. Commenters requested that the EIS address erosion, sedimentation, and subsidence issues associated with potential future projects.

Issue 8: Socioeconomics. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on the social values and economic revenues of the community? What measures will be implemented to protect these values and revenue sources?*

The BLM received 25 comments about impacts of oil and gas development on local economies and services (about 5 percent of the planning issue comments).

Commenters were concerned about impacts on the agricultural economy due to the drawdown or contamination of irrigation water supplies. Additionally, commenters were concerned about the impacts on the state's viticulture (wine) and fishing industries and the subsequent economic impacts this could have on livelihoods. Commenters were also concerned about the impacts on schools, property values, and housing availability and pricing as a result of influx of workers to support new extraction projects in rural communities. Commenters were concerned about changes in tourism from a shift to a more industrialized landscape. Commenters asked that the EIS describe the socioeconomic impacts of accident scenarios. Commenters were also concerned that hydraulic fracturing operations would occur near disadvantaged communities and that the environmental justice impacts would be severe.

Commenters asked that the EIS describe socioeconomic impacts resulting from climate change and how climate change may be affected by the BLM's decisions in this RMP amendment.

Commenters also asked that the EIS describe the economic stimulation effects of new extraction projects in the planning area.

Issue 9: Traffic. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on traffic and local roads? What measures will be implemented to protect local roads and manage increased traffic?*

The BLM received five comments about impacts of oil and gas development on roads and traffic (about one percent of the planning issue comments).

Commenters were concerned about increased traffic, particularly heavy truck traffic, on all county, regional, and city roadways resulting from new extraction projects and from traffic problems during project-related accidents and spills. Commenters requested that a traffic study be prepared in support of the EIS of sufficient geographic scope to adequately identify all potential impacts, including congestion, traffic management, and impacts on infrastructure. Commenters requested that mitigation measures for all traffic circulation and pavement impacts on Monterey County roads be included in the EIS and that the EIS should include analysis of the needs and benefits of providing pedestrian/bicycle facilities as well as carpool/vanpool and other alternative modes of transportation that would reduce peak demand on roadways in future potential project areas.

Issue 10: Tribal and Cultural Resources. *What would be the impact of different approaches to oil and gas management, including well stimulation activities,*

on tribal and cultural resources? What measures will be implemented to protect these resources?

The BLM received 10 comments about impacts of oil and gas development on tribal and cultural resources (about two percent of the planning issue comments).

Commenters were concerned about visual and noise impacts on the Juan Bautista de Anza National Historic Trail.

Native American commenters requested that the EIS address the potential for the disturbance of Native American burials and to explain procedures to deal with such incidents if they were to occur. Native American commenters highlighted the potential presence of Indian sacred sites in future potential project areas, and asked that the EIS address Executive Order 13007 and discuss how the BLM would avoid adversely affecting the integrity, accessibility, or use of sacred sites, should they be identified at or near future project sites. Native American commenters requested that the EIS include a summary of all coordination with tribal individuals and organizations and with the State Historic Preservation Officer/Tribal Historic Preservation Officer, including identification of National Register of Historic Places-eligible sites, and development of a Cultural Resource Management Plan.

Issue 11: Environmental Justice. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on poor, minority, and underrepresented communities? What measures will be implemented to protect these communities from experiencing disproportionate negative effects from oil and gas development?*

The BLM received 14 comments about impacts of oil and gas development on environmental justice populations (about three percent of the planning issue comments).

Commenters were concerned about communities that may be proximate to future well sites and communities that would be affected by (1) air pollution because they are located downwind from future project sites, (2) water pollution from being downstream from future project sites, (3) groundwater contamination from using underground sources that are exposed to fluid migration, and (4) communities disproportionately affected by the impact of climate change. Commenters noted that communities in Kern County already bear disproportionate burdens from air, water, and pesticide pollution and that these communities are consistently ranked as having the worst air pollution in the country.

Commenters requested that any analysis of the environmental justice impacts of increased oil and gas production must look at the effect of that increased production on climate change, and the corresponding disproportionate effects on global environmental justice communities such as the Native Village of Kivalina in Alaska,

which, located north of the Arctic Circle, will be forced to relocate due to the melting ice pack.

Commenters requested the EIS disclose data sources and methodologies used in the environmental justice impact analysis, and the EPA provided specific recommendations as to how to approach the analysis.

Issue 12: Land Use. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing land uses? What measures will be implemented to protect existing land uses?*

The BLM received five comments about impacts of oil and gas development on other land uses (about one percent of the planning issue comments).

Commenters were concerned about impacts on wildlife habitat, viewsheds, and on streams and springs, which could affect uses of those areas by wildlife and recreationalists. Commenters recommended the BLM use buffers to protect other land uses from oil and gas extraction projects.

Issue 13: Livestock Grazing. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on existing livestock grazing operations? What measures will be implemented to protect these operations?*

The BLM received one comment about impacts of oil and gas development on livestock grazing operations (less than one percent of the planning issue comments).

Commenters were concerned about impacts on water supplies used for livestock.

Issue 14: Recreation. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visitor experience and the safety of existing lands and water bodies used for recreation? What measures will be implemented to protect recreational resources?*

The BLM received four comments about the impacts of oil and gas development on recreation (about 1 percent of the planning issue comments).

Commenters were concerned about degradation of scenic beauty and the contamination of lands and soils as a result of future oil and gas extraction projects. Commenters were also concerned about impacts on the recreational opportunities on the Juan Bautista de Anza National Historic Trail and in Pinnacles National Park.

Issue 15: Visual Resources. *What would be the impact of different approaches to oil and gas management, including well stimulation activities, on visual resources? What measures will be implemented to protect these resources?*

The BLM received four comments about impacts of oil and gas development on visual resources (about 1 percent of the planning issue comments).

Commenters were concerned about light pollution from future oil and gas extraction projects and changes to the viewshed from Pinnacles National Park and the Juan Bautista de Anza National Historic Trail.

3.3.2 Other Issues to be Addressed in the RMP Amendment

Of the 734 comments received, 182 comments (25 percent) focused on non-resource specific topics, such as the planning process in general, scope of the EIS, alternatives, or the public involvement process. These topics will be addressed in the RMP amendment but do not fit within any particular planning issue category. Comments are displayed in **Appendix C**, Comments by Resource Planning Issue, **Table C-2**, General Comments Related to the RMP Amendment.

Comments that expressed opinions on what future management direction the BLM should take regarding allowing hydraulic fracturing on public lands were categorized under "Alternatives," since a majority of these comments urged the BLM to ban hydraulic fracturing, and a "no leasing alternative" is clearly an alternative that the public would like to see included in the EIS.

Several commenters also requested the scope of the EIS be expanded to include a more in-depth analysis of a greater range of topics, or be expanded to include a larger geographic region of the state. Of the 734 comments received, 50 comments (6.8 percent) referred to the scope of the project. Some of these comments requested that the EIS encompass other methods of unconventional oil and gas extraction and production and many requested that the BLM analyze all activities surrounding oil and gas extraction and development, including gravel packing and acidization. Commenters also requested that the impact of increasing the number of disposal wells in the state be evaluated. Many commenters requested that all chemicals used in the hydraulic fracturing process be analyzed, including those used in hydraulic fracturing fluid, chemicals used in the event of a spill, and chemicals used as a cleaning solvent for equipment. Others asked that the scope of the EIS include geothermal resource development methods, such as enhanced or engineered geothermal systems (EGS). Others requested the EIS be expanded to cover the entire state of California. These comments are displayed in **Appendix C**, Comments by Resource Planning Issues.

3.4 Issues Not Addressed in the RMP Amendment

Approximately two percent of the comments related to issues that will not be addressed in the RMP amendment. These include issues resolved through policy or administrative action and issues beyond the scope of the RMP amendment that have been considered but will not be included. These comments are

represented in **Appendix C**, Comments by Resource Planning Issue, **Table C-1**, General Comments Outside the Scope of the RMP Amendment, and **Table C-2**, Comments Related to Issues to Be Solved by National Policy.

Administrative or policy issue comments included issues pertaining to national BLM policy that will not be addressed during the Hollister RMP amendment process. Comments primarily included issues related to the independent scientific study conducted by the California Council on Science and Technology and issues related to how the BLM would comply with NEPA. Some issues noted by commenters were issues that are within the scope of the EIS, but have already been resolved through other policy. These comments included recommendations that the BLM adhere to NEPA and CEQ regulations and comments related to the BLM's interaction with other federal agencies.

Some comments were also categorized as issues that are outside of the scope of the RMP amendment. These comments included comments suggesting the BLM not analyze the impacts of hydraulic fracturing fluid in the EIS, that the BLM minimize the analysis of other resources, and comments objecting to the EIS entirely. This category includes comments on issues in which the BLM has limited or no administrative authority.

3.5 Anticipated Decisions

FLPMA requires the BLM to manage public lands using the principles of multiple use and sustained yield. Management direction resulting from the planning process for the RMP amendment needs to be adaptable to changing conditions and demands over the life of the RMP. The RMP amendment will provide management direction and guide decision making for determining appropriate multiple uses and allocation of resources. It will also include strategies to manage and protect resources and systems to monitor and evaluate the status of resources and the effectiveness of management practices. The BLM is reviewing the condition of the environment and the current management situation to identify which management directions should be continued, which should be modified, and which should be developed and added.

This scoping report does not make any decisions, nor does it change current management direction set forth in the 2007 Hollister RMP, as amended. Instead it summarizes those issues identified during the scoping period. The BLM will use planning issues summarized in this scoping report, along with subsequently identified issues, any special studies, and other information (such as the ISA), to help formulate a reasonable range of oil and gas management alternatives during the next phase of the RMP amendment process. Each identified alternative (including continuation of existing management practices) will represent a complete and reasonable plan for managing oil and gas resources in the HFO. Future decisions will occur at two levels: the RMP (or land use plan) level, and the implementation level. These decision types are described below. In general, only land use plan-level decisions will be made as part of the RMP amendment

process. The BLM's evaluation of identified alternatives will be documented in an EIS prepared as part of the RMP amendment process, as required under NEPA.

The kinds of decisions that would be made as part of the RMP Amendment are outlined in Appendix C of the BLM Land Use Planning Handbook (H-1601-1). These decisions include:

- Areas open and closed to leasing
- Opening areas with constraints, such as seasonal and controlled surface use restrictions and no surface occupancy stipulations• Implementing resource condition objectives that have been established and specific lease stipulations, conditions of approval, and best management practices to accomplish objectives in areas open to leasing

The BLM will consider a combination of these decisions based on scoping and planning criteria.

3.5.1 Future Land Use Plan-level Decisions

The RMP amendment will provide a comprehensive yet flexible framework for managing federal minerals within the HFO. Changes to planning decisions regarding mineral management would only occur through another RMP amendment or a full RMP revision, both of which require a NEPA analysis either through an EIS or an environmental assessment.

3.5.2 Future Implementation-level Decisions

The RMP amendment will contain broad-scale decisions that guide future oil and gas management actions. Subsequent site-specific implementation, often characterized as project-level or activity-level decisions, will require the BLM's final approval of on-the-ground actions. Implementation decisions require a more-detailed, site-specific environmental analysis that tiers off of the EIS prepared for the RMP amendment. These decisions generally constitute final approval of on-the-ground actions to proceed (BLM 2005).

Implementation-level decisions require site-specific planning and NEPA analysis. Where implementation decisions are made as part of the land use planning process, they are still subject to the appeals process or other administrative review as prescribed by specific resource program regulations after the BLM resolves the protests to land use plan decisions and makes a decision to adopt or amend the RMP (High Desert Multiple Use Coalition, Inc. et al. Keith Collins, 142 IBLA 285 [1998]).

3.6 Valid Existing Management

The BLM-administered lands within the Hollister RMP planning area are currently managed in accordance with the decisions in the 2007 Hollister RMP (BLM 2007) and subsequent amendments. Decisions in this RMP Amendment

will only address changing usage of well stimulation technologies and changing understanding of their environmental effects. Current plan decisions from the 2007 RMP outside of this scope will be carried forward. .

Additionally, the BLM has identified through its planning criteria that the potential RMP Amendment will retain the existing resource condition goals and objectives in the Hollister RMP and will carry forward any decisions closing areas to oil and gas leasing.

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SECTION 4
PLANNING CRITERIA

During its initial planning sessions, BLM staff developed preliminary planning criteria. Planning criteria establish constraints, guidelines, and standards for the planning process. They help planners define the scope of the process and estimate the extent of data collection and analysis. Planning criteria are based on standards prescribed by applicable laws and regulations; agency guidance; results of consultation and coordination with the public, other federal, state, and local agencies, and tribal individuals and organizations; analysis of information pertinent to the planning area; and professional judgment. The plan will be completed in compliance with the FLPMA, NEPA, and all other applicable laws, regulations, and policies. Impacts from the management alternatives considered in the amended RMP will be analyzed in an EIS developed in accordance with regulations at 43 CFR 1610 and 40 CFR 1500.

The following preliminary criteria were developed internally by the BLM and presented for public comment. After public input is analyzed, the criteria become proposed criteria and can be added to or changed as the issues are addressed or as new information is presented. The BLM managers will approve the issues and criteria, along with any changes.

4.1 PRELIMINARY PLANNING CRITERIA

The following general planning criteria will be considered in development of the RMP amendment:

- The potential plan amendment will be completed in compliance with FLPMA, NEPA, and all other federal laws, executive orders, and management policies for the BLM.
- The potential plan amendment will retain the existing resource condition goals and objectives in the Hollister RMP..

- The potential plan amendment will analyze impacts to areas that are currently open to leasing and will not consider opening areas to leasing that are currently closed.
- The potential plan amendment will recognize valid existing rights.

SECTION 5
DATA NEEDS/GAPS

As part of the RMP planning, evaluation, and data collection process, the BLM has inventoried available information and has identified the need to include new information on well stimulation techniques and their potential environmental effects. A separate but parallel Independent Science Assessment (ISA) of Well Stimulation Technologies is currently being prepared by the California Council on Science and Technology. The ISA will be a compilation and synthesis of existing information about well stimulation technologies and their environmental effects as they pertain to the California-specific oil and gas resources and California's natural environment. The ISA will inform the development of this RMPA/EIS and other future decision-making in the California BLM Oil and Gas Management program. The ISA will address questions and comments brought up by the public during the scoping period

Based on the results of scoping input, the BLM may decide to conduct further studies to support a robust impact analysis in the EIS. Commenters requested several additional studies be conducted in preparation for the EIS. Some of the studies and data requests the commenters identified included:

- Risk assessments that analyze all possible accident scenarios and quantifies the risks of those impacts
- Quantitative air quality modeling
- Geologic study to address the risk of induced seismicity
- Geological stratigraphy surveys that evaluate surface and near-surface traces of known or suspected fault planes in the planning area for the risk of seismic activity
- Hydrological impact assessments
- Traffic analysis that considered impact of increased traffic and impact of heavy trucks on all county, regional, and city roadways

- Inventories and maps of existing wetlands and waters within the planning area, including wetlands regulated under Section 404 of the Clean Water Act and wetlands that are determined to be non-jurisdictional and protected under Executive Order 11990 "Protection of Wetlands" (May 24, 1977). Inventories should include acreages and channel lengths, habitat types, values, and the functions of the waters.

Many commenters also referenced peer-reviewed studies in their comments or suggested literature for BLM review. References that were incorporated into comments substantively are included in **Appendix E**, References Substantially Discussed in Comments.

5.1 Independent Science Assessment (ISA)

The BLM has funded an independent scientific assessment of well stimulation technologies utilized in unconventional oil reservoirs in California which involved an exhaustive review of existing scientific literature and a rigorous peer review protocol.

Preparation of *An Independent Review of Scientific and Technical Information on Advanced Well Stimulation Technologies in California* was led by The California Council on Science and Technology (CCST) and is authored by CCST, Lawrence Berkeley National Laboratory, and Pacific Institute.

The purpose of the ISA is to provide the BLM with an independent technical assessment of well stimulation technologies employed onshore in California, with a focus on hydraulic fracturing. The ISA provides a synthesis of available scientific and engineering information related to hydraulic fracturing and other stimulation technologies used in the state. The information will be used in future planning, leasing, and development decisions. The ISA addresses three key questions: (1) what are the past, current, and potential future practices in well stimulation technologies in California; (2) where will well stimulation technologies allow expanded production of oil onshore in California; and (3) what are the potential direct environmental hazards of well stimulation technologies in California.

The ISA is based on review and analysis of existing data and scientific literature. Preference was given to peer-reviewed scientific literature, but due to limitations of this high quality data source, data gaps existed and other information sources were used. Other sources included government reports and records, web-based databases, and analogues from other locations outside California. CCST assembled a steering committee whose members were appointed based on technical expertise and a balance in technical viewpoints. Lawrence Berkeley National Laboratory was contracted to support the analysis and develop findings. The steering committee used the findings to develop consensus conclusions. The findings were rigorously peer reviewed by CCST and the United States Geological Survey. The ISA will be published by CCST.

The findings of the ISA will provide the best available information to help the BLM conduct a statewide evaluation of oil and gas leasing decisions in RMPs to determine if the decisions reflect current science and best management practices related to well stimulation practices.

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SECTION 6
FUTURE STEPS

6.1 FUTURE STEPS AND PUBLIC PARTICIPATION OPPORTUNITIES

The next phase of the BLM's planning process is to develop draft oil and gas management alternatives based on the issues presented in **Sections 3.2,** Planning Issue Statements, and **3.3,** Summary of Public Comments by Resource Planning Issue Category. These alternatives will address planning issues identified during scoping and will meet goals and objectives to be developed by the BLM's interdisciplinary team. In compliance with NEPA, CEQ regulations, and BLM planning regulations and guidance, alternatives should be reasonable and capable of implementation. The BLM will also meet with cooperating agencies, interested tribes, the RAC, and community groups and individuals. A detailed analysis of the alternatives will be completed, and the BLM's preferred alternative will then be identified.

The analysis of the alternatives will be documented in a Draft RMP Amendment/EIS. Although the BLM welcomes public input at any time during the planning process, the next official public comment period will begin when the Draft RMP Amendment/EIS is published. The draft document will be widely distributed to elected officials, regulatory agencies, and members of the public, and it will be available on the project website. The availability of the draft document will be announced via a Notice of Availability in the *Federal Register*, and a 90-day public comment period will follow. Public meetings will be held throughout the project area during the 90-day comment period.

At the conclusion of the public comment period, the Draft RMP Amendment/EIS may be revised. A Proposed RMP amendment/Final EIS will then be published. The availability of the proposed document will be announced in the *Federal Register*, and a 30-day public protest period will follow regarding the proposed planning-level decisions (43 CFR Part 1610.5.2). If necessary, a notice will be published in the *Federal Register* requesting comments on significant changes made as a result of protest. Concurrently, the California

Governor's office will review the document for consistency with approved state and local plans, policies, and programs.

At the conclusion of the public protest period and the 60-day Governor's consistency review, the BLM will resolve all protests and any inconsistencies, and the approved RMP amendment and Record of Decision will be published. The availability of these documents will be announced in the *Federal Register*. Any implementation-level decisions in the RMP amendment are not subject to the protest process but instead are subject to administrative remedies set forth in regulations applicable to the specific resource management program. These remedies generally take the form of appeals to the Office of Hearings and Appeals within 30 days of the effective date of the Record of Decision or in accordance with the provisions of 43 CFR 4.4.

All publications, including this report, the EIS planning update, the Draft RMP Amendment/EIS, and the Notice of Availability, will be published on the project website. In addition, pertinent dates regarding solicitation of public comments will be published on the website.

6.2 Contact Information

The public is invited and encouraged to participate throughout the planning process for the RMP amendment. Some ways to participate include the following:

- Reviewing the progress of the RMP amendment at the project website, which will be updated with information, documents, and announcements throughout the duration of the RMP amendment preparation
- Requesting to be added to or to remain on the official project mailing list in order to receive future mailings and information

Anyone wishing to be added to or deleted from the distribution list, wishing to change their contact information, or requesting further information are directed on the website and in the EIS planning update to email a request to the project email address or contact the BLM project manager. The BLM project manager, Sara Acridge, can be reached via telephone at (916) 978-4557, via mail at 2800 Cottage Way, Rm W-1623, Sacramento, CA 95825, or via email at blm_ca_ogeis@blm.gov.

SECTION 7
REFERENCES

BLM (US Department of the Interior, Bureau of Land Management). 2005. Handbook H-1601-1—Land Use Planning Handbook. BLM, Washington, DC. March 11, 2005. 161 pp.

_____. 2007. Hollister Field Office Resource Management Plan and Record of Decision.

_____. 2008. Handbook H-1790-1—BLM National Environmental Policy Act. BLM, Washington, DC. January 2008. 184 pp.

BLM GIS. 2005. GIS data for federal mineral estate, and RMP boundary from the Hollister Field Office RMP Final EIS. Acquired from BLM GIS Specialist Vincent Lincoln.

_____. 2013. Published GIS data surface management. Downloaded from www.ca.blm.gov/gis. November 2013.

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Appendix A
Scoping Materials

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APPENDIX A
SCOPING MATERIALS

Public scoping for the HFO Oil and Gas Leasing and Development RMP Amendment/EIS has included an EIS planning update, four scoping public meetings, four news releases, and a public website (www.blm.gov/ca/eis-og). The formal public comment period as required by NEPA began on August 5, 2013, with the publication of a Notice of Intent in the *Federal Register*, and ended on February 28, 2014.

This appendix provides the materials used to advertise the scoping period. These materials include the following:

- *Federal Register* Notice of Intent
- News releases
- EIS planning update
- Newspaper advertisements

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This site displays a prototype of a "Web 2.0" version of the daily Federal Register. It is not an official legal edition of the Federal Register, and does not replace the official print version or the official electronic version on GPO's Federal Digital System (FDsys.gov).

The articles posted on this site are XML renditions of published Federal Register documents. Each document posted on the site includes a link to the corresponding official PDF file on FDsys.gov. This prototype edition of the daily Federal Register on FederalRegister.gov will remain an unofficial informational resource until the Administrative Committee of the Federal Register (ACFR) issues a regulation granting it official legal status. For complete information about, and access to, our official publications and services, go to the **OFR.gov website**.

The OFR/GPO partnership is committed to presenting accurate and reliable regulatory information on FederalRegister.gov with the objective of establishing the XML-based Federal Register as an ACFR-sanctioned publication in the future. While every effort has been made to ensure that the material on FederalRegister.gov is accurately displayed, consistent with the official SGML-based PDF version on FDsys.gov, those relying on it for legal research should verify their results against an official edition of the Federal Register. Until the ACFR grants it official status, the XML rendition of the daily Federal Register on FederalRegister.gov does not provide legal notice to the public or judicial notice to the courts.

The Federal Register

The Daily Journal of the United States Government

Notice

Notice of Intent to Prepare an Environmental Impact Statement for Oil and Gas Leasing and Development on Public Lands and Federal Mineral Estate and Potentially Amend the Hollister Resource Management Plan, CA

A Notice by the **Land Management Bureau** on **08/05/2013**

Action

Notice Of Intent.

Summary

In compliance with the National Environmental Policy Act of 1969, as amended (NEPA), and the Federal Land Policy and Management Act of 1976, as amended (FLPMA), the Bureau of Land Management (BLM) intends to prepare an Environmental Impact Statement (EIS) and potential resource management plan (RMP) amendment to evaluate oil and gas leasing and development on public lands and Federal mineral estate in the Hollister Field Office.

Table of Contents

- **DATES:**
- **ADDRESSES:**
- **FOR FURTHER INFORMATION CONTACT:**
- **SUPPLEMENTARY INFORMATION:**

DATES:

This notice initiates the public scoping process for the EIS. Comments on issues may be submitted in writing until October 4, 2013. The date(s) and location(s) of any scoping meetings will be announced at least 15 days in advance through local media, newspapers and the BLM Web site at: ***www.blm.gov/ca/eis-og***. In order to be included in the Draft EIS, all comments must be received prior to the close of the 60-day scoping period or 15 days after the last public meeting, whichever is later. We will provide additional opportunities for public participation upon publication of the Draft EIS.

ADDRESSES:

You may submit comments related to the Oil and Gas Leasing and Development EIS by any of the following methods:

- *Web site:* ***www.blm.gov/ca/eis-og***
- *Email:* ***BLM_CA_OGEIS@blm.gov***
- *Fax:* 916-978-4388
- *Mail:* 2800 Cottage Way, Rm. W-1623, Sacramento, CA 95825

Documents pertinent to this proposal may be examined at the BLM California State Office, 2800 Cottage Way, Sacramento, CA 95825.

FOR FURTHER INFORMATION CONTACT:

Sara Acridge, Natural Resources Specialist, telephone 916-978-4557; address 2800 Cottage Way, Rm. W-1623, Sacramento, CA 95825; email *BLM_CA_OGEIS@blm.gov*. You may contact Ms. Acridge to have your name added to our mailing list. Persons who use a telecommunications devic for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1-800-877-8339 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION:

The BLM is initiating a planning process to address oil and gas development on public lands and Federal mineral estate in the Hollister Field Office. This Federal Register notice initiates a scoping period to solicit public input on that process. This is the first phase of a process that may lead to the amendment of the Hollister RMP (2006). The BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices).

The outcome of this effort to prepare an oil and gas leasing and development EIS may provide information for the BLM to potentially amend the Hollister RMP in order to establish additional stipulations, conditions of approval, best management practices, or terms and conditions to further guide safe and responsible lease development practices. The EIS will also analyze various current or reasonably foreseeable well completion and stimulation practices, including hydraulic fracturing and the use of horizontal drilling, in the Hollister Field Office. The EIS will further analyze a potential update the reasonably foreseeable development scenario.

In addition to this planning effort the BLM is concurrently initiating a separate peer-reviewed, interdisciplinary assessment of the current state of industry practices for well completion and stimulation in California. This assessment of well completion and stimulation practices will include maps, findings, and synthesized sets of data that will inform the BLM's environmental analysis documents for subsequent oil and gas lease sales. It is anticipated that the information generated by this assessment will be used to inform the planning process.

During the scoping process for this EIS, the high degree of public attention to oil and gas development will provide the BLM with input regarding the suite of oil and gas leasing and development issues and geographic areas that are of most concern to the public. The scoping process will also provide input to assist the BLM in fully developing a range of potential RMP amendment alternatives to address leasing and development and well completion and stimulation practices of concern to the public. In conjunction with the independent science assessment, the BLM will use the results of scoping to refine the geographic scope of the potential plan amendment. In addition, information resulting from the planning and science review will further infor future oil and gas leasing decisions.

The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including alternatives, and guide the process for developing the EIS. Preliminary issues for oil and gas leasing and development to be addressed within the Hollister planning area have been identified by BLM personnel, Federal, State, and local agencies, and other stakeholders, and include: surface water, groundwater, and air quality; greenhouse gases and climate change; the environmental effects of chemicals, if any, used; the potential for induced seismicity; endangered and threatened species; public health and safety; and socioeconomics.

With respect to the potential RMP amendment, preliminary planning criteria include:

- The potential plan amendment will be completed in compliance with FLPMA, NEPA, and all other Federal laws, executive orders, and management policies for the BLM.
- The potential plan amendment will retain the existing resource condition goals and objectives in the Hollister RMP.
- The potential plan amendment will analyze impacts to areas that are currently open to leasing and will not consider opening areas to leasing that are currently closed.
- The potential plan amendment will recognize valid existing rights.

You may submit comments on issues and planning criteria in writing to the BLM at any public scoping meeting, or by using one of the methods listed in the "ADDRESSES" section above.

The BLM will follow NEPA public participation requirements to assist the agency in satisfying the public involvement requirements under Section 106 of the National Historic Preservation Act (NHPA) (**16 U.S.C. 470**(f)) pursuant to **36 CFR 800.2**(d)(3). The information about historic and cultural resources within the area potentially affected by the proposed action will assist the BLM in identifying and evaluating impacts to such resources in the context of both NEPA and Section 106 of the NHPA.

The BLM will consult with Indian tribes on a government-to-government basis in accordance with **Executive Order 13175** and other policies. Tribal concerns, including impacts on Indian trust assets and potential impacts to cultural resources, will be duly considered.

Federal, State, and local agencies, along with tribes and other stakeholders that may be interested in or affected by the proposed action that the BLM is evaluating, are invited to participate in the scoping process and, if eligible, may request or be requested by the BLM to participate in the development of

the environmental analysis as a cooperating agency.

Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Authority:

40 CFR 1501.7.

James V. Scrivner,

Deputy State Director, Energy and Minerals.

[FR Doc. 2013-18839 Filed 8-2-13; 8:45 am]

BILLING CODE 4310-40-P

Release Date: 08/02/13
Contacts: David Christy (BLM) 916-941-3146

News Release No. CA-CC-13-64

BLM California Launches Planning and Science Review Regarding Oil and Gas Development on Public Lands

As part of a cooperative effort with the State of California and in response to a series of legal challenges, the Bureau of Land Management (BLM) will launch a broad science review and a planning review of oil and gas development on public lands managed by the Hollister Field Office in California. The process will evaluate a full range of options, including whether such development is appropriate and if so, where and how it could be carried out safely and responsibly. Information resulting from the planning and science review will further inform future oil and gas leasing decisions.

The planning review will begin with a scoping period to solicit public input. This is the first phase of a process that may lead to the development of an environmental impact statement to amend one or more BLM resource management plans (RMPs) for field offices that have existing leases and expressions of interest in future leasing. Following publication of a Notice of Intent in the Federal Register on August 5 2013, interested parties will have 60 days to submit comments on issues related to oil and gas leasing and development. Public scoping meetings are tentatively scheduled for fall 2013. For more information on the scoping schedule visit: www.blm.gov/ca/eis-og.

The science review will be undertaken as part of a third party independent assessment of industry practices and the geology of oil and gas basins in the state. Led by the California Council on Science and Technology (CCST), the assessment report will consider geology, well completion techniques and the environmental impacts of those techniques. The report, anticipated in early 2014, will be peer-reviewed and published through CCST.

"The planning process, coupled with the findings of the science assessment, will improve our resource management plans," said BLM California State Director, Jim Kenna. "This approach goes a long way toward bringing the most current scientific information on industry practices to planning and public dialogue about oil and gas leasing and development."

Over the last 24 months, most oil and gas leasing actions on BLM-managed public lands in California have been litigated, appealed, or protested. In particular, the Hollister Field Office is facing legal challenges that threaten its ability to conduct oil and gas leasing. The scoping period provides the public an opportunity to comment on the full suite of oil and gas leasing and development issues in the geographic area covered by the field office. In addition, the science review and planning effort will allow the BLM to revisit litigated, appealed, and protested lease sales at a later date. Applications for permits to drill on existing leases will continue to be processed during the reviews.

Fifteen (15) days prior to the public scoping meetings, the BLM will publish a notice of the meetings in the Federal Register, issue news releases and post notices of the dates on multiple BLM California web pages. For more information visit www.blm.gov/ca/eis-og.

--BLM--

Central California District 2800 Cottage Way, Sacramento, CA 95825

Release Date: 10/23/13
Contacts: David Christy (916) 985-4474

News Release No. CA-CC-14-03

BLM California Takes Comments for Planning Review Regarding Oil and Gas Development on Public Lands for 15 Days After Last Public Meeting

The Bureau of Land Management (BLM) will accept scoping comments for the planning review of oil and gas development on BLM-managed public lands in the Hollister Field Office in California for 15 days past the date of the last public meeting.

The BLM initially announced it would take comments for 60 days or 15 days past the last public meeting, whichever came last. Due to delays from the lapse in appropriations and the resulting Federal government shutdown, the public meetings will run beyond the 60-day mark.

Fifteen days prior to the public scoping meetings, the BLM will publish a notice of the meetings in the *Federal Register*, issue news releases and post notices of the dates on multiple BLM California web pages. For more information, visit www.blm.gov/ca/eis-og.

As part of a joint effort with the State of California and in response to a series of legal challenges, the BLM is conducting a planning and science review of oil and gas development on BLM-managed public lands in the Hollister Field Office in California. The process will evaluate a full range of options, including whether such development is appropriate and if so, where and how it could be carried out safely and responsibly. Information resulting from the planning and science review will further inform future oil and gas leasing decisions.

The planning review will begin with a scoping period to solicit public input. This is the first phase of a process that may lead to the development of an environmental impact statement to amend one or more BLM resource management plans (RMPs) for field offices that have existing leases and expressions of interest in future leasing.

--BLM--

Central California District 2800 Cottage Way, Sacramento, CA 95825

Release Date: 01/13/14
Contacts: David Christy (916) 941-3146

News Release No. CC-14-09

BLM Solicits Public Comment to Prepare Environmental Impact Statement on Oil and Gas Leasing and Development

The Bureau of Land Management is conducting a scoping process to solicit public comments on how oil and gas resources on federal mineral estate should be managed in the BLM's Hollister Field Office and whether the BLM should include areas of California beyond the Hollister Field Office in this process.

The public scoping process is the first step in preparing an Environmental Impact Statement.

Public open houses will run from 6 p.m. to 8 p.m. at:

- Jan. 29: San Juan Oaks Golf Course, 3285 Union Road, Hollister.
- Feb. 4: Doubletree Hotel, 2001 Point W Way, Sacramento.
- Feb. 11: Cesar Chavez Library, 615 Williams Road, Salinas.
- Feb. 12: Harris Ranch Inn and Restaurant, 24505 W. Dorris Ave, Coalinga.

The purpose of this planning process is to analyze the effects of alternative oil and gas management approaches on lands with federal mineral estate within the BLM's Hollister Field Office. The need for the plan amendment is to incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends to update the reasonably foreseeable development scenario and the Hollister Field Office Resource Management Plan. The decision to be made is to establish additional lease stipulations, conditions of approval, or best management practices to guide safe and responsible oil and gas development.

Depending on the results of this scoping process, the BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices).

Early public involvement is crucial to identify various issues that should be addressed in the EIS. The scoping period provides the public with an opportunity to learn about the EIS, to help identify issues and concerns to be addressed in the EIS, and to provide input used in developing alternatives to be analyzed in the EIS.

Submit written comments to the Bureau of Land Management, California State Office, 2800 Cottage Way, Oil and Gas Leasing and Development Comments, Attn: Sara Acridge, Project Manager, Sacramento, CA 95825, or via email at BLM_CA_OGEIS@blm.gov.

For more information contact Sara Acridge at (916) 978-4557. Information also is available on the BLM website at www.blm.gov/ca/eis-og.

--BLM--

Release Date: 02/04/14
Contacts: David Christy (916) 941-3146

News Release No. CC-14-20

BLM Solicits Public Comment to Prepare Environmental Impact Statement on Oil and Gas Leasing and Development

The Bureau of Land Management is conducting a scoping process to solicit public comments on how oil and gas resources on federal mineral estate should be managed in the BLM's Hollister Field Office and whether the BLM should include areas of California beyond the Hollister Field Office in this process.

The public scoping process is the first step in preparing an Environmental Impact Statement.

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The purpose of this planning process is to analyze the effects of alternative oil and gas management approaches on lands with federal mineral estate within the BLM's Hollister Field Office. The need for the plan amendment is to incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends to update the reasonably foreseeable development scenario and the Hollister Field Office Resource Management Plan. The decision to be made is to establish additional lease stipulations, conditions of approval, or best management practices to guide safe and responsible oil and gas development.

Depending on the results of this scoping process, the BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Uklah Field Offices).

Early public involvement is crucial to identify various issues that should be addressed in the EIS. The scoping period provides the public with an opportunity to learn about the EIS, to help identify issues and concerns to be addressed in the EIS, and to provide input used in developing alternatives to be analyzed in the EIS.

Submit written comments to the Bureau of Land Management, California State Office, 2800 Cottage Way, Oil and Gas Leasing and Development Comments, Attn: Sara Acridge, Project Manager, Sacramento, CA 95825, or via email at BLM_CA_OGEIS@blm.gov.

For more information contact Sara Acridge at (916) 978-4557. Information also is available on the BLM website at www.blm.gov/ca/eis-og.

--BLM--

Hollister Field Office Oil & Gas Leasing and Development EIS Planning Update

US Department of the Interior
Bureau of Land Management - California

January 2014

Introduction and Overview

The Bureau of Land Management (BLM) California State Office is conducting a scoping process to solicit public comments on how oil and gas resources on federal mineral estate should be managed in the BLM's Hollister Field Office (HFO), and whether the BLM should include areas of California beyond the HFO in this process.



The public scoping process is the first step in preparing an Environmental Impact Statement (EIS) under the National Environmental Policy Act of 1969 (NEPA).

The purpose of this planning process is to analyze the effects of alternative oil and gas management approaches on lands with federal mineral estate within the BLM's HFO. The need for the plan amendment is to incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends to update the reasonably foreseeable development scenario (RFD) and HFO Resource Management Plan (RMP). The decision to be made is to establish additional lease stipulations, conditions of approval, or best management practices to guide safe and responsible oil and gas development.

Depending on the results of this scoping process, the BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices).

Early public involvement is crucial to identify various issues that should be addressed in the EIS. The scoping period provides the public with an opportunity to learn about the EIS, to help identify issues and concerns to be addressed in the EIS, and to provide input used in developing alternatives to be analyzed in the EIS.

HFO Planning Area

The HFO is an administrative unit of the BLM that encompasses the entirety or portions of twelve counties in north-central coastal California (see map). Within this planning area, the BLM manages approximately 280,000 acres of subsurface mineral estate underlying federal surface land and 577,000 acres of split estate land.

NEPA and the EIS

NEPA requires consideration of a reasonable range of oil and gas management alternatives to be analyzed in any EIS.

Each alternative will be analyzed for its anticipated environmental impacts. This comparative analysis will help decision makers choose a path forward that is in alignment with the multiple-use mission of the BLM.

The EIS will provide information for the BLM to amend the Hollister RMP in order to establish additional stipulations, conditions of approval, best management practices, or terms and conditions to further guide safe and responsible lease development practices. The EIS will also help decisionmakers select a "Preferred Alternative" in the Final EIS. Public input on issues related to these decisions is essential and encouraged.

Independent Science Assessment

The BLM is concurrently initiating a separate, independent, peer-reviewed assessment of the current state of industry practices for well completion and stimulation in California. This assessment of well completion and stimulation practices will include maps, findings, and synthesized sets of data that will inform the BLM's environmental analysis documents for subsequent oil and gas lease sales as well as for subsequent oil and gas development NEPA analysis. It is anticipated that the information generated by this assessment will be used to inform the planning process.

& Gas Resources in the HFO

re is currently oil and gas production within the Planning Area. Most of the production comes from oil fields r Coalinga and the Jacalitos Valley in the San Joaquin Management Area (MA). Additionally, the San Ardo and sociated oil fields are located within the Salinas MA; however, little of this area is on lands managed by the BLM. ewise, the Vallecitos oil fields are in the San Benito MA, but, again, little of the production is on lands managed y the BLM. Exploratory oil wells have historically been drilled on less than 5 percent of the leases issued on BLM ulic lands.

HFO manages 45,900 acres of federal oil and gas leases and 80 BLM-permitted oil and gas wells. This is the l number of wells on federal mineral estate, including wells on both federal surface and split estate lands.

cisions to be Made

Hollister RMP revision may establish additional stipulations, conditions of approval, best management ctices, or terms and conditions to further guide safe and responsible lease development practices. The RMP esion may also identify new areas to be closed to oil and gas leasing.

cisions coming out of the EIS will not affect oil or gas extraction on state lands or private lands that do not ae federal mineral estate. Decisions coming out of the EIS will not authorize any actual drilling for exploration development of oil and gas resources. Subsequent NEPA analysis would be required for any such proposals, ich would involve further public scoping, public involvement, and environmental impact analysis. The RMP ndment would not result in opening areas to oil and gas leasing that are currently closed.

Phases of BLM Authorization Prior to Oil & Gas Development

Planning/RMP	Leasing	Development
Occurs via RMP revision or amendment	Occurs via lease sale	Receive *Application for Permit to Drill* (APD) from oil or gas company
Define which areas are open or closed to leasing	Confirm nominated area is defined as "open to leasing" in RMP	Confirm proposed activities conform to lease stipulations
Develop list of stipulations that can be applied to future leases to protect resources	Evaluate presence of environmental resources on nominated area	Apply Conditions of Approval to specific plan of operations
	Apply stipulations to lease to protect identified resources	Issue or Deny Permit to Drill
	Auction off lease at public auction, with stipulations known to bidders	

Current phase

As outlined on the left, there are three main phases of BLM authorization that must take place before any oil or gas development can occur. Separate NEPA and public involvement is required at each phase.

The first phase is the "planning" phase, which occurs through an RMP amendment or revision. Through this process, lands are identified as being open or closed to leasing. Also at this phase, stipulations are developed, which can then be applied at the leasing phase.

Leases are issued at a lease auction. Prior to going to auction, a nominated parcel is evaluated for environmental resources, and the BLM applies protective stipulations on the parcels, as needed.

At the development phase, the BLM can attach additional Conditions of Approval, or deny an Application for Permit to Drill altogether.

lanning Criteria

ith respect to the RMP amendment, preliminary planning criteria include the following:

- The plan amendment will be completed in compliance with Federal Land Policy and Management Act, NEPA, and all other federal laws, executive orders, and management policies for the BLM.
- The plan amendment will retain the existing resource condition goals and objectives in the Hollister RMP.
- The plan amendment will analyze impacts to areas that are currently open to leasing and will not consider opening areas to leasing that are currently closed.
- The plan amendment will recognize valid existing rights.

How Can You Participate?

Public involvement is an integral part of preparing the California Oil & Gas Leasing and Development EIS. This publi scoping period gives the public and other interested agencies and organizations the opportunity to provide comments o issues to be addressed and information sources to use in the EIS before the BLM begins drafting it.

The official scoping period began with the publication of the Notice of Intent (NOI) in the Federal Register on August 5 2013, and will continue for 207 days (ending on February 28, 2014). During the scoping period, the BLM will host fou public open houses across the planning area and in Sacramento. Notices directing the public to the EIS website, which ha information on these meetings, will be published in local newspapers.

The public is formally invited and encouraged to participate in preparation of the EIS during public scoping period. Some ways you can participate are by:

- ✓ Attending one or more of the open house meetings to learn about the project and planning process and to meet BLM representatives;
- ✓ Reviewing the progress of the EIS on-line at the EIS website at: www.blm.gov/ca/eis-og. The website will be updated with information, documents, and announcements throughout the EIS preparation;
- ✓ Mailing a comment to the EIS mailing address at:

  BLM, California State Office
  Attn: HFO O&G Leasing EIS
  2800 Cottage Way, Rm. W-1623,
  Sacramento, CA 95825
- ✓ Emailing a comment to the project email address BLM_CA_OGEIS@blm.gov;
- ✓ Joining the EIS mailing list to receive future mailings and information, by emailing us at BLM_CA_OGEIS@blm.gov;
- ✓ Submitting any process-related questions to the e-mail address provided above.

Upcoming Public Meetings

Each meeting will start with an open house at 6 pm and will be followed by a presentation from 6:15 to 6:35. A public discussion session will follow for up to one hour, followed by additional open house time until 8:00.

The public discussion portion of the meeting time will be for members of the public to make public statements, although only written comments will be entered into the project record.

The open house time will be for browsing the information stations that will be set up, having conversations with BLM staff, and for preparing written comments for those who seek to do so at the meeting.

Wednesday, January 29, 2014
San Juan Oaks Golf Course
3285 Union Road, Hollister, CA 95023

Tuesday, February 4, 2014
Doubletree Hotel
2001 Point W Way, Sacramento, CA 95815

Tuesday, February 11, 2012
Cesar Chavez Library
615 Williams Road, Salinas, CA 93905

Wednesday, February 12, 2014
Harris Ranch Inn & Restaurant
24505 W Dorris Avenue, Coalinga, CA 93210

What Kinds of Comments are Helpful?

- Providing studies or data on the environmental impacts of hydraulic fracturing, specifically for oil and gas in the Monterey shale and other formations. These kinds of comments can contribute to a more robust environmental impact analysis.
- Describing specific environmental, human, or economic resources that you are concerned about and how they may be affected by oil and gas leasing decisions on federal mineral estate in the HFO.
- Suggesting areas of land to be made remain open or be closed to leasing, and suggesting stipulations (restrictions) on certain parcels of land or for certain kinds of resources on lands. These kinds of comments tie directly into the decisions that would be made in an RMP amendment and help analysts and decisionmakers focus on key areas of concern.
- Suggesting alternatives to be considered in the EIS.
- Suggestions on geographic scope of the EIS.

EIS Flowchart

EIS Process Flowchart

Current phase →

Issue Notice of Intent to prepare EIS and begin scoping

↓

Conduct Scoping Aug '13-Feb '14
- Provide minimum 60-day comment period on issues & planning criteria
- Document results in **Scoping Report**

↓

Formulate Alternatives

↓

Analyze Effects of Alternatives

↓

Select Preferred Alternative

↓

Prepare Draft EIS

↓

Publish Notice of Availability
- Provide minimum 90-day public comment period

↓

Prepare Proposed Final EIS

↓

Publish Notice of Availability
- Provide 30-day protest period
- Resolve protests

↓

Prepare Record of Decision

* Required documents in black and underlined

PUBLIC NOTICE

#29309

Notice of Public Scoping and Coalinga Meeting on Oil and Gas

The U.S. Bureau of Land Management (8LM) is soliciting comments during a public scoping process for an Environmental Impact Statement (EIS) for oil and gas leasing and development on Federal mineral estate in the 8LM Hollister Field Office. Comments an issues to be addressed and alternatives to be considered in the EIS will be accepted through February 28, 2014, and may be submitted by email to BLM_CA_OGEIS@blm.gov or by mail to the address below.

Four public scoping meetings will be held across north-central California. A meeting will be held in Coalinga on Wednesday February 12, 2014, from 6 pm - 8 pm at the Harris Ranch Inn & Restaurant, 24505 W Dorris Ave. For further information on the public scoping meetings and the EIS process, visit the project website at: www.blm.gov/ca/eis-og. To have your name added to the project mailing list, send an email to the email address above. You may also contact Sara Acridge, EIS Project Manager; telephone 916⅞978⅞4400; address 2800 Cottage Way, Rm. W-1623, Sacramento, CA 95825.

Notice of Public Scoping and Hollister Meeting on Oil and Gas

The U.S. Bureau of Land Management (BLM) is soliciting comments during a public scoping process for an Environmental Impact Statement (EIS) for oil and gas leasing and development on Federal mineral estate in the BLM Hollister Field Office. Comments on issues to be addressed and alternatives to be considered in the EIS will be accepted through February 28, 2014, and may be submitted by email to BLM_CA_OGEIS@blm.gov or by mail to the address below.

Four public scoping meetings will be held across north-central California. A meeting will be held in Hollister on Wednesday January 29, 2014, from 6 pm – 8 pm at the San Juan Oaks Golf Course, 3285 Union Rd. For further information on the public scoping meetings and the EIS process, visit the project website at: www.blm.gov/ca/eis-og. To have your name added to the project mailing list, send an email to the email address above. You may also contact Sara Acridge, EIS Project Manager; telephone 916-978-4400; address 2800 Cottage Way, Rm. W-1623, Sacramento, CA 95825.

Publish: January 17 & 24, 2014
F/11550768

The Sacramento Bee

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DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

January 20, 26, 2014

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **January 26, 2014**

(Signature)

NO 361 PUBLIC NOTICE

Notice of Public Scoping and Sacramento Meeting on Oil and Gas

The U.S. Bureau of Land Management (BLM) is soliciting comments during a public scoping process for an Environmental Impact Statement (EIS) for oil and gas leasing and development on Federal mineral estate in the BLM Hollister Field Office.

Comments on issues to be addressed and alternatives to be considered in the EIS will be accepted through February 28, 2014, and may be submitted by email to BLM_CA_OGEIS@blm.gov or by mail to the address below.

Four public scoping meetings will be held across north-central California. A meeting will be held in Sacramento on Tuesday February 4, 2014, from 6 pm - 8 pm at the Doubletree, 2001 Point West Way.

For further information on the public scoping meetings and the EIS process, visit the project website at: www.blm.gov/ca/eis-og. To have your name added to the project mailing list, send an email to the email address

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Notice of Public Scoping and Salinas Meeting on Oil and Gas

The U.S. Bureau of Land Management (BLM) is soliciting comments during a public scoping process for an Environmental Impact Statement (EIS) for oil and gas leasing and development on Federal mineral estate in the BLM Hollister Field Office. Comments on issues to be addressed and alternatives to be considered in the EIS will be accepted through February 28, 2014, and may be submitted by email to BLM_CA_OGEIS@blm.gov or by mail to the address below.
Four public scoping meetings will be held across north-central California. A meeting will be held in Salinas on Tuesday February 11, 2014, from 6 pm – 8 pm at the Cesar Chavez Library, 615 Williams Road. For further information on the public scoping meetings and the EIS process, visit the project website at: www.blm.gov/ca/eis-og. To have your name added to the project mailing list, send an email to the email address above. You may also contact Sara Acridge, EIS Project Manager; telephone 916-978-4400; address 2800 Cottage Way, Rm. W-1623, Sacramento, CA 95825.

Published 1/27/14 and 2/5/14

Product	Requested Placement	Requested Position	Run Dates	# Inserts
Monterey Herald	Legals CLS	General Legal-1076~	01/27/14, 02/05/14	2
i.Upsell MontereyHerald	Legals CLS	General Legal-1076~	01/27/14, 02/05/14	2

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Appendix B
List of Commenters

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APPENDIX B
LIST OF COMMENTERS

The formal public comment period as required by NEPA began on August 5, 2013, with the publication of a Notice of Intent in the *Federal Register*, and ended on February 28, 2014. **Table B-1**, Commenters, lists the commenters who submitted written submissions to the BLM for the HFO Oil and Gas Leasing and Development RMP Amendment/EIS as part of the public scoping process. All comments received on or before February 28, 2014, were included in this scoping report. The commenters are listed in chronological order of when their comments were received. Form letters submissions are not included in **Table B-1**, Commenters. **Table B-2**, Form Letter Submissions, includes a brief description of the form letters received, including number of letters received.

Table B-1
Commenters

	Commenter Name	Affiliation	Date Received (Month/Day/Year)
		Federal Government Agency	
1.	Patricia L. Neubacher	National Park Service	9/24/2013
2.	Scott Sysum	US Environmental Protection Agency	2/25/2014
		Local Government Agency	
1.	Christopher B. Mynk	Kern County	8/15/2013
2.	Michael Novo	Monterey County	10/4/2013
3.	Arnaud Marjollet	San Joaquin Valley Air Pollution Control District	1/29/2014
4.	Tera Chumley	Stanislaus County	2/24/2014
		Tribal Individuals and Organizations	
1.	Louise J. Miranda Ramirez	Ohlone/Costanoan-Esselen Nation	2/11/2014
		Business/Commercial Sector (if applicable)	
1.	Richard Ranger	American Petroleum Institute	10/4/2013
2.	Catherine H. Reheis-Boyd	Western States Petroleum Association	2/27/2014

Table B-1
Commenters

	Commenter Name	Affiliation	Date Received (Month/Day/Year)
		Organization (non-profit, citizen's group)	
1.	Center for Biological Diversity	Center for Biological Diversity	9/23/2013
2.	Stephan C. Volker	North Coast Rivers Alliance	10/1/2013
3.	Multiple submitters	CREDO action	10/2/2013
4.	Janie Painter	Medicine Lake Citizens for Quality Environment	10/2/2013
5.	Jhon Arbelaez	Earthworks	10/3/2013
6.	Dr. Tom Williams	Citizens Coalition for a Safe Community	10/4/2013
7.	Hollin Kretzmann	Center for Biological Diversity	10/4/2013
8.	George W. D. Pack	San Benito Rising	1/29/2014
9.	Peter Hain	San Benito Rising	1/29/2014
10.	Hillary Aidun	Center for Biological Diversity	2/4/2014
11.	Michael Kerhin	Sierra Club Loma Prieta Chapter	2/4/2014
12.	Kevin Collins	The Sierra Club, Ventana Chapter	2/13/2014
13.	Amanda Reed	The Nature Conservancy	2/21/2014
		Individual	
1.	Sheri McGowan		8/22/2013
2.	Alan Jorgensen		10/2/2013
3.	Alixandra Mullins		10/2/2013
4.	Ann Wellhouse		10/2/2013
5.	Anthony Biondo		10/2/2013
6.	Barbara Ferguson		10/2/2013
7.	Brenda Lee		10/2/2013
8.	Brigitte Desouches		10/2/2013
9.	Bruce Jackson		10/2/2013
10.	Carlin Black		10/2/2013
11.	Carol Warren		10/2/2013
12.	Carol Hasenick		10/2/2013
13.	Charlene Hillman		10/2/2013
14.	Charles Callen		10/2/2013
15.	Chris Finnie		10/2/2013
16.	Connie Rogers		10/2/2013
17.	Cynthia Dela Rionda		10/2/2013
18.	Dana L. Stewart		10/2/2013
19.	David Waldon		10/2/2013
20.	Deborah Carosela		10/2/2013
21.	Dennis K. Mann		10/2/2013
22.	Dirk van Nouhuys		10/2/2013
23.	Dr. Robert Petty		10/2/2013
24.	Eileen Bill		10/2/2013
25.	Elizabeth Gulick		10/2/2013
26.	Emily Jencks		10/2/2013

Table B-1
Commenters

	Commenter Name	Affiliation	Date Received (Month/Day/Year)
27.	Eric Bernhard		10/2/2013
28.	Eve Simmons		10/2/2013
29.	Ezra Jones		10/2/2013
30.	Forrest Batson		10/2/2013
31.	Georgiana K. K. Birch		10/2/2013
32.	Heidi Guillermo		10/2/2013
33.	Ida E. Casillas		10/2/2013
34.	J. K.		10/2/2013
35.	James Heartland		10/2/2013
36.	James O'Connell III		10/2/2013
37.	Jan Charvat		10/2/2013
38.	Janet Smarr		10/2/2013
39.	Jay Myers		10/2/2013
40.	Jeff Cordeiro		10/2/2013
41.	Jessica Carson		10/2/2013
42.	John Wood		10/2/2013
43.	John Taijala		10/2/2013
44.	Judith Stege		10/2/2013
45.	Judy Thibodeau		10/2/2013
46.	K Burch		10/2/2013
47.	Karen Raskin		10/2/2013
48.	Kathy Smith		10/2/2013
49.	Lang M. Dayton		10/2/2013
50.	Laura Peck		10/2/2013
51.	Lee Rosen		10/2/2013
52.	Lia von Damm		10/2/2013
53.	Linda Baumann		10/2/2013
54.	Lori Paul		10/2/2013
55.	Lynete Coffey		10/2/2013
56.	Margaret Harrell		10/2/2013
57.	Mary Bresnan		10/2/2013
58.	Mary Williams-Fields		10/2/2013
59.	Micahel Griffin		10/2/2013
60.	Michael Collins		10/2/2013
61.	Mitchell Enfield		10/2/2013
62.	Nicholin Wagner Quakenbush		10/2/2013
63.	Pamela Cundy		10/2/2013
64.	Patti Montgomery		10/2/2013
65.	Peter Joyce		10/2/2013
66.	Phyllis Butler		10/2/2013
67.	R T		10/2/2013
68.	R P		10/2/2013
69.	Richard Elliot		10/2/2013

Table B-1
Commenters

	Commenter Name	Affiliation	Date Received (Month/Day/Year)
70.	Richard Jones		10/2/2013
71.	Rick Nixon		10/2/2013
72.	Rick Blanc		10/2/2013
73.	Robert McCombs		10/2/2013
74.	Robert Hathaway		10/2/2013
75.	Ron Jeske		10/2/2013
76.	Sadie Sullivan-Greiner		10/2/2013
77.	Shari Home		10/2/2013
78.	Shawn Hoose		10/2/2013
79.	Siddharth Mehrotra		10/2/2013
80.	Suzanne Nathans		10/2/2013
81.	Suzy Lyons		10/2/2013
82.	Tanya Wilhelm		10/2/2013
83.	Victoria Wu		10/2/2013
84.	Wilma Ralls		10/2/2013
85.	Yosh Yamanka		10/2/2013
86.	Shauna Haines		10/13/2013
87.	Teresa Paris		10/21/2013
88.	Mitchell Drachman		11/19/2013
89.	Stuart Phillips		1/20/2014
90.	Pauline Seales		1/28/2014
91.	Gabriel Michaels		1/29/2014
92.	Jeannette Langstaff		1/29/2014
93.	CJ Jawahar		2/4/2014
94.	Arielle Tonkin		2/5/2014
95.	Hugh Moore		2/5/2014
96.	Jeffrey Meyer		2/5/2014
97.	Kimberly Tomicich		2/5/2014
98.	Samantha Ngotel		2/5/2014
99.	Alby Quinlan		2/6/2014
100.	Kayla Reeser		2/7/2014
101.	Sara A. Steiner		2/11/2014
102.	Anna Rikkelman		2/12/2014
103.	Jeff Irwin		2/12/2014
104.	Brett Garrett		2/26/2014
105.	Bert Johnson		2/27/2014
106.	Katherine He		2/27/2014
107.	Laura Daly		2/27/2014
108.	Brian Treanor		2/28/2014
109.	Don Larkin		2/28/2014
110.	Kimberly Osborne	Quinnipiac Law Review	2/28/2014

Table B-2
Form Letter Submissions

Organization Identified (if any)	Number of Form Letters Received	Description of Form Letter Contents
(none identified)	3	Comments express opposition to hydraulic fracturing
CREDO action	10,577	Comments express opposition to hydraulic fracturing

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Appendix C

Comments by Resource Planning Issue

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APPENDIX C
COMMENTS BY RESOURCE PLANNING ISSUE

The BLM received 734 discrete comments during the Hollister RMP amendment scoping period. These comments were classified by RMP amendment process category and by planning issue. Comments for each the RMP amendment process categories and for planning issue categories are included in this appendix. Comments are included verbatim from the comment letters; however, information in letters that was not considered a comment is not included here. Comments are included for the following groups:

Comments by Process Category:

Table C-1 Alternatives (p. C-3)

Table C-2 General Comments Related to the Project (p. C-10)

Table C-3 Issues Inside Scope – Already Addressed Under Existing Policies, Plans, and Legislation (p. C-18)

Table C-4 Issues Outside of Scope – Resolved through Policy (p. C-21)

Table C-5 Scope of the EIS (p. C-24)

Comments by Planning Issue:

Table C-6 Issue No. 1: Water Resources (p. C-33)

Table C-7 Issue No. 2: Health and Safety (p. C-48)

Table C-8 Issue No. 3: Vegetation and Wildlife (p. C-21)

Table C-9 Issue No. 4: Air Quality (p. C-6924)

Table C-10 Issue No. 5: Climate Change (p. C-79)

Table C-11 Issue No. 6: Geology and Seismicity (p. C-86)

Table C-12 Issue No. 7: Soil Resources (p. C-93)

Table C-13 Issue No. 8: Socioeconomics (p. C-96)

Table C-14 Issue No. 9: Traffic (p. C-97)

Table C-15 Issue No. 10: Tribal and Cultural Resources (p. C-99)

Table C-16 Issue No. 11: Environmental Justice (p. C-101)

Table C-17 Issue No. 12: Land Use (p. C-102)

Table C-18 Issue No. 13: Livestock Grazing (p. C-103)

Table C-19 Issue No. 14: Recreation (p. C-104)

Table C-20 Issue No. 15: Visual Resources (p. C-105)

Table C-1
Alternatives

Both the EIS and the Statewide Study should include all of the subjects outlined below. Inclusion of each topic is prerequisite for BLM to make an informed decision regarding approach to the exploitation of federal mineral estate in the Hollister Field Office and throughout California. In addition, BLM must thoroughly consider all reasonable alternatives, including, at a minimum, cancellation of the 2011 and 2012 Hollister Field Office lease sales that have been litigated, and, more broadly, a prohibition on all oil and gas activities in areas managed by the Hollister Field Office as well as a prohibition on all unconventional oil and gas activities in areas managed by the Hollister Field Office.

As explained in Section III, alternatives should include a full consideration of a complete prohibition of hydraulic fracturing, acidization, and other dangerous and unconventional oil and gas extraction. Because a properly conducted EIS and Statewide Study are likely to show that the risks to public health, safety, and the environment cannot be eliminated or fully mitigated through regulation, a prohibition is the only alternative that can stop the damage to human health and safety and the environment posed by unconventional drilling on public lands.

NEPA requires that an agency consider all reasonable alternatives to the proposed regulation. The agency must also identify the alternative that is environmentally preferable, which is typically "the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." As stated above, the agency's action must satisfy the goals of NEPA, which are to:

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The EIS must thoroughly consider all reasonable alternatives, including, at a minimum, cancellation of the 2011 and 2012 Hollister Field Office lease sales that have been litigated, and, more broadly, a prohibition on all oil and gas activities in areas managed by the Hollister Field Office as well as a prohibition on all unconventional oil and gas activities in areas managed by the Hollister Field Office. A prohibition on all oil and gas activities is the best alternative, and is the only alternative that will satisfy each environmental goal of NEPA. The benefits of this alternative are substantial, and it is the only option that completely eliminates the following risks and harms that would otherwise be caused by unconventional oil and gas extraction techniques and associated operations:

(1) groundwater contamination;

(2) surface water contamination;

(3) freshwater depletion;

(4) air emissions of hazardous air pollutants and other air toxics;

(5) damage to wildlife and their habitats;

(6) greenhouse gas emissions;

(7) induced seismicity.

Eliminating these occurrences will lead to invaluable benefits that include:

Table C-1
Alternatives

1)	Cleaner, safer, and more reliable water supply;
2)	Fewer illnesses and deaths caused by exposure to contaminated water;
3)	Preservation of jobs in industries dependent on clean and ample freshwater;
4)	Cleaner and safer air quality;
5)	Fewer illnesses and deaths caused by exposure to polluted air;
6)	Increased opportunities for recreation due to clean air and water;
7)	Fewer workplace accidents on well sites;
8)	Increased health to wildlife populations and greater biodiversity;
9)	Mitigation of global warming;
10)	Reduction of death, injury, and property damage caused by seismic activity
11)	Reduction of truck traffic and damage to roads
12)	Higher property values for land that would otherwise be located close to a well site.

BLM is also considering revisions to the 2006 Hollister Field Office's Resource Management Plan ("RMP") (2006). The revisions should reflect the scope of the EIS and Statewide Study and implement the best alternative of prohibiting oil and gas extraction techniques on federal land and subsurface rights administered by the Hollister Field Office.

A prohibition is consistent with the current Hollister RMP's goals and objectives for air, soil, water, vegetation, wildlife, and visual resources management, special status species protection, fire management, recreation, livestock grazing, energy and minerals, cultural resources, paleontological resources, social and economic conditions, transportation and access, hazardous materials and public safety, and land realty.

Conversely, continuing to allow oil and gas extraction, including unconventional methods, would run counter to many if not all of the stated objectives in the current Hollister RMP. For example, it is impossible to "protect public health and safety and environmental resources by minimizing environmental contamination from past and present land uses..on public lands" while allowing extreme oil and gas extraction to endanger public health and safety and the environment. Similarly, it is difficult to reconcile the Hollister RMP's goal to "maintain, restore, or improve water quality and quantity to sustain the designated beneficial uses on BLM lands" without consideration of a complete ban on oil and gas extraction techniques that pose grave threats to water quality and supply.

Thus, changes to the Hollister Office RMP should be made to respond to the risks analyzed in the EIS and Statewide Study and to accomplish the best alternative of prohibiting oil and gas extraction on BLM mineral estate in this area. BLM should extend these RMP revisions to other field offices to protect all public lands in California from further damage from oil and gas activities, and in particular from the latest unconventional techniques including fracking and acidizing.

The alternatives considered in the EIS must include at a minimum, cancellation of the 2011 and 2012 Hollister Field Office lease sales subject to litigation, and, more broadly, a prohibition on all oil and gas activities in areas managed by the Hollister Field Office as well as a prohibition on all unconventional oil and gas activities in areas managed by the Hollister Field Office. A prohibition on all oil and gas activities is the only option that will completely eliminate the risk of several of the harms described above. Revisions to the Hollister office's RMP should be implemented after a full consideration of the EIS and Statewide Study in order to protect people, wildlife, and our public lands from the many risks and damages of oil and gas extraction.

Table C-1
Alternatives

BLM land in all California Field Offices should be closed to further oil and gas development and future leasing of oil and gas. Specifically, BLM land must be closed to oil and gas development that involves hydraulic fracturing.
I'm writing to urge you to continue to halt new oil lease sales on California's public lands while these studies are completed.
The best way to protect our treasured public lands along with our air, water, health, and climate from fracking is to simply prohibit this inherently dangerous form of fossil fuel extraction. There's no better place to start than by banning fracking on our public lands. It would make no sense to go forward with new oil and gas lease sales before studies are complete.
Please prohibit new oil lease sales on California's public lands while you study fracking's threats to our Golden State. Critical decisions about opening more of California public lands to oil and gas development and fracking cannot be informed decisions until your studies are complete.
BLM should adopt an immediate ban on oil and gas development on our public lands. Our public federal lands are an invaluable asset and should be protected. Federal public lands include some of the most beautiful, biologically diverse, and ecologically important land in California. Allowing oil and gas activity, including operations that employ fracking, to occur in these areas is an unacceptable risk. Consequently, oil and gas leases on federal land should be prohibited indefinitely.
The BLM must include a no-oil-and-gas-lease alternative in its EIS. Under NEPA, an agency must consider "all reasonable alternatives" to its action. This includes the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. A permanent ban on leases for oil and gas development is the only alternative that eliminates the risks posed by oil and gas development.
[The Project Description must include:] The Project Alternatives the Preferred Alternative and if different the Environmentally Superior Alternative Listing and Compilation of Features for All Alternatives
In regard to the issue of the recommendation of alternatives during scoping; the alternatives to the project analysis should included a review of the potential for wind and solar power development, including where, how, and with what limitations. Realistic mitigations might be possible with renewable energy. We would not recommend the placement of wind turbines in the habitat of the endangered California Condor. But there may be areas under BLM jurisdiction where such projects would be a beneficial alternative to fracking oil development. Renewable energy must soon be our primary energy source in the very near future if the planet is to avoid the catastrophic impacts of climate change and ocean acidification caused by the build up of excess carbon dioxide.
California is a leader when it comes to protecting the environment. The State Legislature will soon be voting a statewide moratorium on fracking and other aggressive oil and gas extraction. The California Coastal Commission will soon announce its findings on the dangerous practice of off-shore drilling. Many local governments, including Marin, San Benito and Santa Cruz County, have passed local ordinances on fracking. It's time for the BLM to realize the public dangers posed by these extreme energy extraction practices and amend the Hollister Field Office's RMP to include a ban on fracking. The same should apply to all regional management plans in BLM's California State Offices.

Table C-1
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All areas should be closed to Fracking (hydraulic fracturing) or "Fracking like" activities based on experience to date and knowledge of the current technology and limited knowledge of total impacts. Other conventional access to oil and gas resources should be evaluated against above concerns prior to opening areas.
Examine other land uses that do not have as many potentially high negative consequences. Such as agriculture, wind farms, solar farms,
Regarding alternatives, the EIS should take a different approach. The 2006 Hollister RMP EIS considered alternatives that would strike different balances of competing land uses, such as preservation of sensitive resources, grazing, recreation, and mining as well as oil and gas leasing. For the new EIS, the NOI instead describes a specific oil and gas leasing EIS, focused on this single use. According to the January 2014 EIS Planning Update, the "decision to be made is to establish additional lease stipulations, conditions of approval, or best management practices to guide safe and responsible oil and gas development." As such, alternatives to be considered would be alternative suites of standard lease stipulations and conditions, while the "no project alternative" would be continued reliance on the list of stipulations and conditions in Appendix D of the 2006 RMP EIS. As discussed above, the EIS should not reopen the basic goals and objectives of the existing RMP or the selection of the preferred alternative incorporating an appropriate balance among competing uses.
In the public scoping meetings held in January and February 2014, some commenters have proposed that the EIS consider a moratorium or ban on well stimulation as "alternatives" pursuant to NEPA. WSPA does not believe that a moratorium or ban alternative is appropriate. NEPA requires consideration of a reasonable range of alternatives to a proposed action. "Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense"; see Council on Environmental Quality, 40 Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Question 2a. The severe consequences to California's economy and energy supplies would render a moratorium or ban impractical or infeasible. Moreover, a moratorium or ban would be inconsistent with the basic goals and objectives of the existing RMP and with the balance struck in the selected preferred alternative.
I am here from San Francisco on behalf of the Center for Biological Diversity to ask BLM to permanently close off our public lands to the oil and gas industry.
We have gathered over 10,000 comment letters asking BLM to keep our public lands free from oil and gas activity. These include some of the most beautiful and ecologically important land in California. Allowing oil and gas activity, including operations that employ fracking and other unconventional fossil fuel extraction methods, to occur in these areas presents unacceptable risks. These industrial operations could irreparably harm our water, air, wildlife, and climate. Consequently, oil and gas leases on federal land should be prohibited indefinitely.
We applaud BLM's halt to oil and gas leases and drilling permits while the agency satisfies its legal obligation to complete an Environmental Impact Statement. We strongly urge BLM to continue this halt while the EIS is being conducted. We are confident that once all of the harms from oil and gas development are made clear, the BLM's only reasonable option will be to prohibit not just fracking, but all oil and gas activity on public lands.
We entrust our public lands to the government so that they can be enjoyed by all people and future generations. We depend on the BLM to keep those lands safe and unpolluted. When looking at all the potential harms posed by these dangerous activities, it should be clear that the only option that will avoid the threat to our water, air, health, and climate is to ban oil and gas development on public lands.
Please take the necessary steps to ban fracking and acidization on federal land. The EIS must include an alternative that bans oil and gas leases while encouraging development of renewable energy sources.
But even for those who have doubts about global warming, some of the new oil drilling technology is really frightening This includes hydraulic fracturing (fracking), and I definitely support a moratorium and a permanent ban on fracking.

Table C-1
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So, in summary, I think oil exploration and development should be banned on federal land. The Environmental Impact Study needs to include an alternative that bans oil and gas leases while encouraging renewable energy sources ("Wind, Geothermal, Solar, etc." as highlighted on BLM's comment form). But if oil development is allowed, there must be a ban on well stimulation techniques, including fracking and matrix acidization.
Ban fracking now in the county of San Benito and the State of Calif.
A draft of proposed regulations by the California Department of Oil and Gas and Geothermal Resources that was recently receiving public comment contained language requiring notification and before and after water monitoring for adjacent landowners if a well bore was within 1500 feet of a property boundary. Project Indian is slated to expand to 640 acres if pilot studies prove the project feasible. If the oil recovery well bores were kept further than 1500 feet from property lines it is conceivable that thousands of wells could be drilled with no notification or testing at all for adjacent property owners. If oil and gas development were allowed to proceed on BLM lands then notification and before, during and after water monitoring of all contiguous property should be required.
The BLM moratorium to halt all oil and gas leases was the correct action and, in order to "protect, preserve, and enhance historic, cultural and natural resources," the Hollister Field Office's Regional Management Plan along with the rest of the state of California, should make it a permanent ban.
The BLM should operate under the precautionary principle when it comes to hydraulic fracturing. Hydraulic fracturing should not be utilized as an oil and gas well stimulation technique until: - All impacts have been analyzed and until more studies have been done about the health impacts of the chemicals in the fracturing fluid and drill lubricants - More is known about the likelihood of well casing failure - More is known about the relationship between induced seismicity and wastewater injection, and until - More is known about the potential of fracturing fluid left underground after completion to contaminate groundwater. Currently much of this is unknown and studies are continuing to reveal more and more about the serious and negative impacts of hydraulic fracturing.
All areas in the HFO should be closed to leasing and on all existing leases, the HFO should attach COAs for new permits to drill that do not allow well stimulation technologies such as hydraulic fracturing and well acidization.
Public lands are supposed to be preserved for the public, not handed over to private profit-making industries that will poison the water, soil, and air. I urge you to impose a moratorium on this practice until the BLM's studies are completed and demonstrate that fracking can be done without harming Californians, our public lands, our precious water, or the climate.
It's seems strange to allow fracking on public lands in California while preparing an Environmental Impact Statement and independent analysis of fracking. I would urge a continuation of the moratorium new oil leases- or at least on fracking- until the BLM's studies are completed and demonstrate that fracking can be done without harm.
The best way to protect our treasured public lands along with our air, water, health, and climate from fracking is to simply prohibit this inherently dangerous form of fossil fuel extraction. There's no better place to start than by banning fracking on our public lands. It would make no sense to go forward with new oil and gas lease sales before studies are complete.
Please prohibit new oil lease sales on California's public lands while you study fracking's threats to our Golden State. Critical decisions about opening more of California public lands to oil and gas development and fracking cannot be informed decisions until your studies are complete.

Table C-1
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We respectfully request BLM to continue to prohibit new oil, gas and geothermal lease sales on California's public lands while you study fracking's threats to our Golden State. Critical decisions about opening more of California public lands to oil and gas development and fracking cannot be informed decisions until your studies are complete and include geothermal fracking.
Due to the wide-ranging dangers of unconventional oil, gas and geothermal extraction, we strongly urge BLM to extend its current moratorium on oil and gas leases to include geothermal leases to thoroughly evaluate the full array of impacts and threats.
Do not allow fracking on California public lands. Ruining our water and ecosystems forever is not acceptable. Protect the land and water. There is no amount of money to be made that is worth ruining our beautiful state forever.
As a member of the public who has studied geophysics, I am deeply concerned about the practice of fracking for the removal of natural gas. When I first learned of the practice I predicted earthquakes, groundwater pollution, ground subsidence, and eventual travel of the pollutants to the surface 'downstream' through aquifers, faults, and natural fissures in the bedrock. We haven't seen all these yet, but there is strong evidence of the first two in the other states. Please, do not lift the fracking moratorium in California until the environmental studies are complete, and then only if they indicate the practice has no long-term damaging effects for the environment.
I think these examples and more show that fracking poses a serious threat to my home state. I therefore ask you to impose a moratorium on this practice until the BLM's studies are completed and demonstrate that fracking can be done without harming California.
All said, fracking should certainly not be allowed on public lands in California. The unfortunate passage of the Senate Bill 4 indicates that the gas and oil industry has bought off CA politicians who approved the giant loopholes and CEQA exemption for fracking; or, our state legislators have failed to take the time to accurately understand the full risks of fracking and the affect of fracking on climate change. Perhaps the state legislature suffers from both "faults" (pun intended); however, in any case, SB4 will not successfully "regulate" fracking. With this in mind, I strongly urge that the BLM be highly responsive to good science and a full, objective EIR process. Act conservatively until all the data re: fracking has been independently analyzed. Do not "cave in" to the pressure and greed of those promoting fracking in California. Please implement a full moratorium on fracking on all BLM lands immediately until all studies are completed.
Impose a moratorium on this practice until the BLM's studies are completed and demonstrate that fracking can be done without harming Californians or the climate.
I am so disappointed to learn that so much fracking has already been done in our beautiful state- which is currently lacking in clean water (which is wasted in huge amounts in the fracking process!!!!). So, please at least put a moratorium on the process until or unless it can be proven that it is safe and harmless.
fracking has already been shown to be a dangerous and damaging practice and I want it banned in California. Once the BLM studies are completed, this will be proven. I beg you not to approve fracking on ANY California land.
Since it is impossible to isolate water below the ground from fracking- both public and private land fracking should be prohibited. Money/payoffs and sealed agreements never to speak of harm done do not restore a more precious commodity- such as clean water, soil, and human life.
Fracking is already damaging ground water, and is seriously degrading the areas where it is practiced. We don't need the oil from fracking, not at the expense of our water sources. Water is already at a premium. It will be more so, going forward. Water is more important than oil. This is basic common sense. Please apply it to this situation and extend the moratorium.
I strongly urge you to wait until your proposed (Federal Register, 8/5/13) environmental impact statement, analyzing the potential impacts of allowing hydraulic fracturing on the 284,000 acres of public land within the Hollister field office's jurisdiction, is completed, before resuming new oil lease sales on California's public lands. I further urge you to discontinue the processing of permits to drill on existing leases, until the EIS has been completed. It makes no sense to allow hydraulic fracturing and related methods, which are strongly suspected to be potentially serious threats to public health and the environment, as well as significant contributors to global warming, to be utilized, before their potential impacts have been thoroughly studied and evaluated.

Table C-1
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Please don't allow continued fracking on California public lands while preparing an Environmental Impact Statement and independent analysis of fracking. Fracking threatens our precious water supply as well and human and environmental health.. Impose a moratorium on fracking until the BLM's studies can demonstrate that fracking can be done without harming Californians or the climate.
Evidence in other states shows fracking contributes to ground water and well pollution and may be involved in triggering earthquakes in areas where earthquakes were formally minimal or nonexistent. California is earthquake central. DO NOT allow fracking in California. The hazards to air, water and soil pollution are known. The hazards they might present to our fault lines are not worth the risk
I, and my family, personally believe, that the wise, temporary moratorium on new oil lease sales put in place earlier this year by the Bureau of Land Management should be made permanent but certainly it should not be lifted before these studies are complete and can demonstrate to the Public, without any doubt, that fracking can be done without harming Californians, the land, or the climate.
Because fracking is still a new method of extracting natural gas and because there has been widespread concern primarily about its potential to contaminate groundwater, lakes, and streams, the safer course for the BLM and the entire state of California would be to have a moratorium on fracking for two reasons. First, the risks of fracking will become more evident as the experiences of other states that have fracked for years, like Pennsylvania and Ohio, gives it an environmental track record. The second reason is that, with experience, states and gas companies will become better at avoiding adverse environmental consequences of fracking and dealing with them when they occur, as they have and will in the future.

Table C-2
General Comments Related to Project

The decision of how and whether to permit unconventional oil and gas extraction on federal mineral estate and public lands is a broad and far-reaching determination that will require a full and candid assessment of a full range of environmental impacts. We commend BLM for launching both an environmental impact statement ("EIS") for the Hollister Field Office and a statewide study of the impacts of hydraulic fracturing, acidization, and other unconventional oil and gas extraction methods (the "Statewide Study"). As noted by BLM, the Statewide Study will be "[l]ed by the California Council on Science and Technology (CCST), the assessment report will consider geology, well completion techniques and the environmental impacts of those techniques."
Under NEPA, agencies must use "all practicable means" to protect the environment by adhering to the purposes of NEPA, which are to: (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources. In passing NEPA, Congress also recognized and enshrined the principle that "each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment."
Agencies must take a "hard look" at the environmental consequences of their actions before these actions occur; and agencies must make the relevant information available to the public so that it may also play a role in both the decision-making process and the implementation of that decision.
The objectives of the scoping process are to 1) Identify potentially interested parties; 2) Identify public and agency concerns 3) Define the range of issues that will be examined in the plan 4) Ensure that relevant issues are identified early and drive the analysis; and 5) Establish a public record.
Another requirement of NEPA mandates that BLM evaluate and consider in its EIS all reasonable alternatives. Federal agencies must ""rigorously explore and objectively evaluate all reasonable alternatives.. [and] [d]evote substantial treatment to each alternative considered in detail.." The comparison between different alternatives should study, at minimum: (1) Direct effects and their significance; (2) Indirect effects and their significance; (3) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies

Table C-2
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and controls for the area concerned; (4) The environmental effects of alternatives including the proposed action; (5) Energy requirements and conservation potential of various alternatives and mitigation measures; (6) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures; (7) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures; and (8) Means to mitigate adverse environmental impacts.
Include, in the DEIS, a list of BMPs that may be required to protect surface water and groundwater resources, and the circumstances under which the BMPs would be applied (e.g., proximity to surface water resources, presence of erosive soils, slope, shallow water aquifers, proximity of water wells, etc.).
Explain, in the DEIS, how the BLM would ensure that the BMPs would be monitored and enforced.
We recommend following CEQ's recent guidance, Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Signficant Impact, when addressing mitigation of any impacts identified in the DEIS.
The cumulative impacts analysis should provide the context for understanding the magnitude of the impacts of the alternatives by analyzing the impacts of other past, present, and reasonably foreseeable projects or actions and then considering those cumulative impacts in their entirety (CEQ's Forty Questions, #18). The DEIS should clearly identify the resources that may be cumulatively impacted, the time over which impacts would occur, and the geographic area that would be impacted by the proposed projects. The DEIS should focus on resources of concern- those resources that are "at risk" and/or are significantly impacted by the proposed projects, before mitigation. In the introduction to the Cumulative Impacts Section, identify which resources are analyzed, which ones are not, and why.
Identify the current condition of the resource as a measure of past impacts. For example, the percentage of species habitat lost to date.
Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis.
Identify the future condition of the resource based on an analysis of impacts from reasonably foreseeable projects or actions added to existing conditions and current trends.
Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives.
Disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts.
Identify opportunities to avoid and minimize impacts, including working with other entities.
The use of fracking anywhere is not consistent with the effort to move our world to a sustainable environment.
There is not yet enough baseline information about the impacts of hydraulic fracturing for the BLM to conduct a comprehensive impact analysis. There are too many unknowns about the impacts of hydraulic fracturing at this point for the BLM to accurately and properly analyze the impacts of fracking in the EIS.
Unfortunately, leakages and spills are usual. Best management practices and specific plans of optimal operations cannot prevent mechanical error, miscalculations of geology, and other accidents. The impacts analysis should assume leaks, spills and human and wildlife contact with fracturing fluid will occur, not that everything will go according to plan.

Table C-2
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Additionally the RMP established the energy and mineral resource management objective of balancing responsible mineral resource development with the protection of other resource values; based on the currently-known negative impacts to surface water and ground water, to air quality, and to human health and safety through exposure to endocrine disruptors and other chemicals present in fracturing fluids that are highly likely due to fracking, it will be impossible for BLM to achieve these RMP objectives while using hydraulic fracturing as an oil and gas extraction method.
The Hollister Field Office's RMP should include a ban on oil and gas leases. Given the potential for environmental harm to the Hollister Field Office's management area, the regional office's RMP should be amended to include a ban on all oil and gas development leases. The same should apply to all regional management plans in California.
On behalf of the County of Monterey, I am writing to share the County's concerns regarding the potential sale of oil and gas leasing and development on public lands and federal mineral estate and the potential amendment to the Hollister RMP and to request that EIS document address those concerns. The County requests explicit notification of all upcoming proposals, applications to drill and determinations of the BLM. All notifications may be sent to the County in care of Michael Novo, Director of RMA-Planning, 168 West Alisal Street, 2nd Floor, Salinas, CA 93901 or by e-mail to novom@co.montery.ca.us
The County supports the decision to prepare this EIS and requests that the document analyze not just hydraulic fracturing and horizontal drilling, but all reasonably foreseeable well completion and stimulation practices and all foreseeable related impacts. It cannot be assumed that once opened for leasing and development that there will be only a few permits issued. The County assumes that the number of permits will greatly expand and that the impact cannot be understated. The EIS should include analysis of both the immediate and cumulative impacts due to oil and gas development and should include analysis of impacts to private as well as public lands.
The County assumes that leasing of BLM lands and federal mineral estate for gas and oil development may result in impacts to traffic/road infrastructure, water quality, water quantity, aesthetics, hazardous materials exposure, seismic hazards and housing.
The County strongly urges the BLM to include a robust analysis of all of the potential impacts in the EIS so that the decision regarding the potential amendment of the Hollister RMP and the decision as to whether and how leasing of federal lands for oil and gas development should occur will be made with full public disclosure of the potential impacts to the environment.
We have reviewed various accessible documents regarding the proposed "Project" and have been thoroughly confused as to what the "Project(s)" and "RMP" and "EIS" and "Studies" are and what comments are requested. Therefore our comments will attempt to formulate a "best-guess" Project and then provide comments on what must be included and how the elements must be organized within the Project and the Environmental Impact Statement (EIS) for such a Project.
We request that a Scoping Report be circulated at a later date with a request for additional public comments, OR that BLM revise and recirculate the entire NOI for further comments. General Comments include: Project Description must include all Oil and Gas (O&G) Exploration and Production (E&P) Facilities and Operations within any BLM Areas; RMP - Prepare a Progammatic RMP for California/Statewide O&G-E&P facilities and operations in any BLM areas, with detailed tiered-RMP for the Hollister Area; EIS - Prepare a Progammatic EIS for California/Statewide E&P RMP(s) with detailed tiered-EIS for the BLM Hollister Area RMP; "Studies" - Provide all supporting efforts and documents and include in appendices for RMP and EIS and in searchable web-accessible documents; "Terms" - Provide section of Definitions, Glossary, and Acronyms to be consistently and comprehensively applied throughout all documents, for example "development" for BLM-RMP is different from E&P "development" and O&G refers to an industrial sector including refining and retailing which I don't believe are covered in the BLM definition of O&G;

Table C-2
General Comments Related to Project

Inter-/Intra-Agency Coordination - A statewide workshop(s) to establish a regulatory program.
Available documents do not provide a clear and consistent presentation of the "Project" for an EIS but the Notice appears to include the following three elements: a. RMP for Hollister to act as template for other districts b. Programmatic EIS for BLM RMP and Leases for Oil and Gas/Exploration and Production along with Project Specific Tiered EIS for Hollister RMP c. Supporting Studies and Other Documents for PEIS and RMP
"Reasonably Foreseeable Development Scenario" depends on the basis of defining and must thoroughly define: "Reasonably" and "Foreseeable", since all primary parameters for the leasee, and perhaps the leaser, are of financial and risks management character.
In response to recent National Environmental Policy Act ("NEPA") litigation involving BLM lease sales for oil and gas development in the Monterey Shale formation in the Hollister Field Office, BLM has decided to complete an Environmental Impact Statement ("EIS") for the scope of lands covered by the entire Hollister Field Office. If conducted appropriately and within a reasonable timeline, this could be an effective and efficient means of authorizing additional lease sales for oil and gas development in light of a further vetting of the environmental issues pertaining to such development. In contrast, an open ended process, timeline, and scope of review would only serve to unnecessarily delay the development of resources and fulfillment of BLM's mission under the Mining and Minerals Policy Act ("MMPA") to promote shale oil development. Specifically, in order to ensure that the EIS process is completed in an effective manner that realizes the goals of the Bureau for these lands and the interests of outside stakeholders, we recommend the following:
There Are Compelling Reasons for BLM to Move Forward Expeditiously Timely completion of the EIS is in the best interests of the public as a whole and of the Industry Associations' members and is consistent with BLM's statutory multiple use mandate. A timely resolution of the NEPA process, followed by responsible development of the Monterey Shale, offers significant benefits for citizens of California and of the entire nation. The 1,750 square mile Monterey Shale, which encompasses part of the lands administered by the Hollister Field Office, is the largest shale oil formation in the United States. The United States Energy Information Administration ("EIA") estimates that it holds 15.4 billion barrels of oil. BLM has a statutory obligation to make management decisions "on the basis of multiple use and sustained yield." 43 USC. § 1701(a)(7). As part of that mandate, BLM is required to manage federal lands "in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands including implementation of the Mining and Minerals Policy Act of 1970." Id. § 1701(a)(12) (emphasis added). In turn, the MMPA directs BLM to "foster and encourage private enterprise in . . . the development of economically sound and stable domestic mining . . ." and specifically includes shale oil among the minerals that BLM must promote. See 30 USC. § 21a.
Due to the negative impacts to surface water and groundwater, to air quality, and to human health through exposure to endocrine disruptors and other chemicals present in fracking fluids, it will be impossible for the BLM to reach these RMP objectives while using hydraulic fracturing as an oil and gas extraction method.
California's SB4 requires the regulation of all well stimulation techniques, including acidizing, which will be the technique used for O&G extraction in the state. SB4 also requires the disclosure of all chemicals used during drilling operations. It is imperative that the BLM include similar rules and regulations for use in public lands in California. Doing so will help protect public health, the environment, respect the will of the people of California, and ensure that O&G development in the state will be conducted in a safe and responsible manner.
The best environmental analysis, by itself, cannot protect public health and the environment from the impact of energy development. It is necessary for the BLM to consider all possible alternatives, as well as all the cumulative impacts associated with additional permitting of O&G development. A full economic analysis, paired with a vigorous health impact study, and an extensive public review period is necessary to safeguard the public, the environment, and the sustainability of California's public lands.

Table C-2
General Comments Related to Project

In addition to potentially unlocking billions of barrels of previously unrecoverable oil, the new fracking techniques pose serious, novel, and little-understood risks to human health and the natural environment. Such risks include irreparably contaminating surface and groundwater, contributing to air pollution and climate change, killing and sickening livestock, fish, and wildlife, and inducing earthquakes, as well as contributing to global warming from the combustion of oil and gas.
San Benito and Monterey Counties are unique and desirable locations for farming, ranching, recreation, and wildlife conservation. The open working landscapes that define San Benito County and areas of Monterey County are not only essential to our community's rural traditions, economic stability and food production but also to the conservation of our natural and cultural resources. For further information, please contact Karen Beppler-Dorn, Superintendent, Pinnacles National Park, 5000 Highway 146, Paicines, CA 95043 (831) 389-4486 x233.
Concerned about: Migration of negative impacts from above s beyond specific lea s and beyond BLM controlled areas.
Issues raised in "Gasland" and "Gasland 2" documentaries by Josh Fox.
Particular concern for Salinas Valley and areas that could impact the Salinas Valley.
In addition, The Nature Conservancy has been an active participant in working with the Department of Interior on ways to improve mitigation for impacts to public lands. In October, Secretary Jewell issued Secretarial Order 3330 to establish a Department-wide mitigation strategy for development on public lands. We want to emphasize three components of this Secretarial Order as important for this EIS: 1. In the order, the term "mitigation" refers to the entire mitigation hierarchy: avoidance first, then minimization of impacts, and finally offsets to compensate for unavoidable impacts. 2. The Order specifically applies to oil and gas development 3. Five elements are central to Departmental mitigation strategy and should be incorporated into this EIS: a. Use of a landscape-scale approach to identify and facilitate investment in key conservation priorities in a region; b. Early integration of mitigation considerations in project planning and design; c. durability of mitigation measures over time; d. Transparency and consistency in mitigation decisions; and e. Mitigation efforts that improve the resilience of our nation's resources in the face of climate change.
The Conservancy thus strongly supports implementation of the ideas included in the Secretarial Order in the Hollister EIS, including an evaluation of how the Bureau will incorporate the mitigation hierarchy and other aspects of the Order in the pending oil and gas environmental impact statement and accompanying scientific study. In particular the analysis should set standards for those effects on lands and water resources that must be avoided (e.g., habitat), how effects will be minimized (including limiting surface disturbance through the use of smaller multi-well pads, co-locating roads and pipeline infrastructure, etc.), and how unavoidable adverse effects will be offset.
In the August 2013 comments TNC submitted on BLM's proposed agency-wide hydraulic fracturing rules (attached), we cited with approval BLM's use of landscape scale analysis, combined with avoidance requirements and compensatory mitigation that the agency implemented in Wyoming's Pinedale Anticline oil and gas leasing and development. We believe that model should serve as a prototype here.

Table C-2
General Comments Related to Project

Other Scoping Recommendations: Conventional and Unconventional Oil and Gas Development, Groundwater, Fragmentation, and State and Local Coordination
BLM's Federal Register announcement recounts a reasonably inclusive list of preliminary scoping issues to be addressed by the EIS. These include surface water, groundwater, air quality, greenhouse gases and climate change, the environmental effects of fracking chemicals, potential for induced seismicity, endangered and threatened species, public health and safety and socioeconomics. We concur that the EIS should fully address all of these issues.
To date, the majority of oil and gas development that has occurred in California has been from conventional reservoirs. However, the application of well stimulation in combination with other techniques (e.g., horizontal drilling) has allowed for development of unconventional oil and gas development in other parts of the United States and may allow for similar development in California. To understand the full range of potential environmental impacts from oil and gas development, the BLM should analyze separately the development of conventional oil and gas reservoirs as distinct from development of unconventional oil and gas resources.
For both conventional and unconventional oil and gas development, the EIS should: - Identify and map all existing oil and gas development in California, including all development on BLM-managed lands and sub-surface resources and all BLM existing oil and gas leased tracts in the state. - Identify all existing wells in which well stimulation practices have been used, and, for these wells, any reports or information evidencing well failures, casing or cement failures, spills, or groundwater or surface contamination.
In addition, for unconventional oil and gas development, the EIS should map areas where the Monterey Shale and other shale resources exist and analyze where new oil and gas development is reasonably likely to occur.
Lastly, the EIS should evaluate how state and local regulation and controls will be accommodated in federal leasing and development areas. As noted above, the State of California enacted new legislation requiring a scientific study of the effects of well stimulation practices and set up permit requirements for oil and gas production using well stimulation practices. It is important for BLM's EIS to include an evaluation of how state--and especially county and local jurisdiction--requirements will affect and be accommodated in BLM's oil and gas leasing programs.
With regard to addressing "the environmental effects of chemicals, if any, used" in well stimulation (78 Fed.Reg. 47409), the EIS should draw on available information on the chemical composition of well stimulation fluid. The implementation of FracFocus, which WSPA fully supports, has effectively served to provide timely public information about the content of hydraulic fracturing fluid. In addition, S.B. 4 and interim implementing regulations require public disclosure regarding the base fluid and each additive contained in well stimulation fluids used, as well as the total volume of fluid used. 14 Cal. Code Regs. § 1788.
The Bureau of Land Management's environmental impact statement (EIS) must seriously and comprehensively consider all the environmental consequences of oil and gas production in BLM- controlled areas. These consequences include a few I'll discuss in more detail here- climate change, the release of toxic chemicals into the earth and the air, methane discharges from well heads, and the consumption of large amounts of water in drilling operations.
I urge the BLM to manage the oil and gas within its purview by doing everything in its power to make sure the carbon stays safely sequestered in the ground. Do not issue any new oil or gas leases. Close all areas that you can to oil and gas leasing. Where leases have already been granted, impose stringent requirements that (a) prevent toxic contamination now and in the future, (b) prohibit methane releases, and (c) allow only minimal water consumption.
Any benefits from fossil fuel extraction are short-term only. But just one error, or one "compromised" well, can have devastating long-term consequences for the entire region.
It states currently oil and gas production is going on in fields near Coalinga and Jacalitos Valley in the San Joaquin MA, in San Ardo and fields in Salinas MA, and San Benito MA has oil fields in Vallacitos. In addition, HFO manages 45,900 acres of federal oil and gas leases and 80 BLM permitted oil and gas wells. This is more than enough for such destructive extractions. Adverse effects are endangering our health, water and planet.

Table C-2
General Comments Related to Project

If historic accident rates aren't available, the EIS must justify how such activities can be approved without a thorough risk analysis
On behalf of the members of the undersigned organizations, we respectfully request BLM to hold several public hearings before the agency issues its draft Environmental Impact Statement (EIS) on Oil and Gas Leasing on California Public Lands, independent scientific study of fracking statewide and potential amendments to the Hollister Resource Management Plan (RMP).
We request that at a minimum hearings be held in Monterey, Kern County, Los Angeles, Santa Barbara, and the San Francisco Bay Area. These are communities where fracking is already underway or likely to expand or where there is deep concern about the impacts of fracking statewide. We request that the hearings be held at hours and locations convenient to the working public and that Spanish language translation be provided.
Scoping and other key decisions on the EIS and RMP will have a substantial effect on the final assessment on environmental impacts. The public's heightened interest in this issue and the enormous potential effect that oil and gas development will have on the environment and public health mandate that the public be given a full and fair opportunity to provide its input through several public hearings. People throughout California live amongst and neighboring public lands and will be directly affected by any oil and gas development on them.
As your agency is certainly aware, there is a tremendous amount of interest in oil and gas development on public lands. When BLM solicited comments for its rules on hydraulic fracturing ("fracking") earlier this year, over 650,000 people submitted comments in favor of a ban. A sizable portion of those comments were from Californians, who have seen fracking operations expand rapidly over the last few years. These communities, including over 6.7 million people who live in the Hollister District's eight counties alone, will be the ones to bear the burden of impacts of fracking and other oil and gas activity, have a right to have their voices heard on the proper scope of the EIS before BLM commences its study.
Different constituencies will undoubtedly have valuable input on each of these and potentially other topics, and allowing the public to discuss each of these areas of concern will take time. In addition, any amendments to the RMP will also have a long-lasting effect on the manner in which decisions about oil production are made. The public needs ample opportunity to voice their opinions about any changes to the RMP.
The public should also have adequate time to comment on the independent science review that will assess the state of industry practices and the geology of oil and gas basins. Because this study informs the EIS, the public should be part of the process for shaping the scope of the scientific assessment.
The breadth of the EIS scoping issues, the scientific study, and the concurrent consideration of amendments to the Hollister RMP are broad enough in themselves, but BLM also cites the potential to extend the use of the Hollister Office's EIS and RMP as models for the entire state of California, making it quite probably that the Hollister Office's actions will affect the entire state. Due to the breadth, potential impact, and public interest of the scope of the EIS, the BLM should plan for requested public hearings to allow Californians to speak about their concerns regarding oil and gas development.
I urge you to examine the results of fracking in Towanda, PA and Karnes City, TX
please not this article in the Bloomberg Business Week today: http://www.businessweek.com/news/2013-10-02/radiation-in-pennsylvania-creek-seen-as-legacy -of-fracking-waste
A draft of proposed regulations by the California Department of Oil and Gas and Geothermal Resources that was recently receiving public comment contained language requiring notification and before and after water monitoring for adjacent landowners if a well bore was within 1500 feet of a property boundary. Project Indian is slated to expand to 640 acres if pilot studies prove the project feasible. If the oil recovery well bores were kept further than 1500 feet from property lines it is conceivable that thousands of wells could be drilled with no notification or testing at all for adjacent property owners. If oil and gas development were allowed to proceed on BLM lands then notification and before, during and after water monitoring of all contiguous property should be required.

Table C-2
General Comments Related to Project

The BLM should operate under the precautionary principle when it comes to hydraulic fracturing. Hydraulic fracturing should not be utilized as an oil and gas well stimulation technique until: - All impacts have been analyzed and until more studies have been done about the health impacts of the chemicals in the fracturing fluid and drill lubricants - More is known about the likelihood of well casing failure - More is known about the relationship between induced seismicity and wastewater injection, and until - More is known about the potential of fracturing fluid left underground after completion to contaminate groundwater. Currently much of this is unknown and studies are continuing to reveal more and more about the serious and negative impacts of hydraulic fracturing.
It's dangerous and irresponsible to allow fracking to continue on public lands in California while preparing an Environmental Impact Statement and independent analysis of fracking in California.
Perform a diligent 3rd Party Air and Water Test Analysis on the areas of localized Fracking to determine real dangers before giving approval.
Do not life the moratorium on new oil lease sales until the environmental impact studies are completed. There is enough evidence from other fracking problems in other states to require the Precautionary Principle to be used in decision making by the BLM.
We must have both studies completed on the fracking risks before lifting any moratorium on fracking on public lands. And there are pending requests for the Secretary of the Interior to reopen the hastily and erroneously closed investigations in 3 states where fracking has resulted in irreparable damage to the water table and land where it has been done.
The cost is too great and more studies need to be done, at the very least, before/IF these corporations are given permission to frack in California.
Where is the proof that fracking can be done without harming Californians or the climate? Fracking has been implicated in countless health and environmental tragedies all around the country.

Table C-3
Issues Inside Scope – Already Addressed Under Existing Policies, Plans, and Legislation

The de facto moratorium should remain in place. BLM agreed to halt oil and gas leases on federal land, but left unclear whether it would end the moratorium in the future. One of the basic tenets of environmental and public health protection is that we should study and understand the risks before proceeding with an activity. It would be irresponsible to allow any fracking activity before the EIS is complete.

BLM Should Complete the NEPA Analysis in as Timely and Efficient a Manner as Possible in One Year or Less

BLM's decision to prepare an EIS to assess the potential environmental impacts associated with well drilling and completion techniques such as horizontal drilling and hydraulic fracturing is of critical importance for lessees and potential lessees within the Hollister Field Office and beyond. Lessees under existing leases, including those leases at issue in CBD v. BLM, No. 11-6174 (N.D. Cal.) and CBD v. Jewell, No. 13-1749 (N.D. Cal.), may face a de facto moratorium on exploration activities on federal lands within the Hollister Field Office until the EIS is complete. Likewise, prospective lessees in the area overseen by the Hollister Field Office will experience delays as future lease sales are placed on hold until the NEPA process is complete. Moreover, BLM has indicated that it may extend its NEPA analysis to other areas in California. 78

Fed. Reg. at 49,408 (BLM "may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah Field Offices).") Indeed, BLM's conclusions here, along with any amendments to the 2006 Hollister Field Office RMP ("2006 RMP"), may well inform future BLM decisions for other locations with viable shale reserves.

Given the significant and pressing interests of current lessees in areas overseen by the Hollister Field Office and the significant economic benefits associated with shale oil development, BLM must complete its NEPA analysis without undue delay. At the same time, the potentially broad scope that BLM has suggested for this NEPA analysis demands a review based on sound science that ensures the accuracy of BLM's ultimate conclusions. To achieve these two goals, the Industry Associations urge BLM to comply with the Council on Environmental Quality's ("CEQ's") NEPA regulations by adopting a timely and efficient schedule for completing its NEPA analysis and by taking advantage of existing analyses to narrow the scope of the NEPA review.

A. BLM Should Set a Timely Schedule of No More than One Year to Complete the NEPA Review in an Expeditious Manner

Foremost, consistent with CEQ regulations, BLM should set a schedule to complete this NEPA review promptly. While "[a]ccurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA," 40 C.F.R. § 1500.1(b), the CEQ regulations stress that NEPA reviews must be completed in a timely manner. The regulations repeatedly admonish agencies to avoid delay in the NEPA process. E.g., 40 C.F.R. §§ 1500.5, 1501.1(a), 1502.4(d). In order to complete NEPA reviews in an expeditious manner, CEQ directs agencies to streamline the NEPA process through a variety of means, including coordinating with other agencies, id. § 1501.6; eliminating duplicative work, id. §§ 1502.20 (tiering), 1502.21 (incorporation by reference); deemphasizing insignificant issues, id. § 1500.4(g); and adopting deadlines for the NEPA analysis, id. § 1501.8.

Establishing firm deadlines for NEPA review- including for each constituent part of the review process- is among the most effective tools BLM has at its disposal for avoiding undue delay. CEQ regulations encourage federal agencies "to set time limits appropriate to individual actions (consistent with the time intervals required by [40 C.F.R.] § 1506.10). 40 C.F.R. § 1501.8; see also CEQ, Final Guidance on Improving the Process for Preparing Efficient and Timely Environmental Reviews Under the National Environmental Policy Act, 77 Fed. Reg. 14,473, 14,475 (Mar. 12, 2012) ("Agencies are encouraged to develop meaningful and expeditious timelines for environmental review."). In fact, CEQ directs agencies to consider adopting specific timelines "for each constituent part of the NEPA process." 40 C.F.R. § 1501.8(b)(2). BLM's implementing regulations echo this requirement. See 43 C.F.R. § 46.240(a) ("For each proposed action, on a case-by-case basis, bureaus shall: (1) Set time limits from the start to the finish of the NEPA analysis and documentation, consistent with the requirements of 40 CFR 1501.8 and other legal obligations . . . .").

In light of these regulatory requirements, the Industry Associations request that BLM establish, as part of the scoping process, a specific and enforceable schedule for the completion of its EIS for the Hollister Field Office. The Industry Associations believe that adopting a 12-month deadline for completing the EIS is both sufficient and consistent with BLM's NEPA obligations and appropriately values the goals of accuracy and prompt resolution of NEPA analyses. Further, a 12-month deadline is consistent with CEQ's own guidance that "under the new NEPA regulations, even large complex energy projects would require only about 12 months for the completion of the entire EIS process." CEQ, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Question 35 ("CEQ FAQ"). A 12-month deadline is also supported by the

Table C-3
Issues Inside Scope – Already Addressed Under Existing Policies, Plans, and Legislation

intended scope of BLM's proposed EIS, which will inform the very narrow question of whether the Hollister RMP should be amended. See 78 Fed. Reg. at 47,408.
Second, BLM should follow the authority the Congress delegated to EPA and the State of California under the Clean Air Act. While certain air emissions are associated with well development and completion, those emissions should not be addressed through BLM lease conditions. Instead, such emissions should be addressed through any applicable Clean Air Act permits administrated by the state of California subject to EPA oversight. EPA is fully aware of air emission issues associated with hydraulic fracturing that may fall within the Clean Air Act's regulatory jurisdiction. Air emission issues can be addressed through existing and generally applicable permitting requirements, as well as any EPA air emission regulations that are specifically applicable to such emissions. See 77 Fed. Reg. 49,490 (Aug. 16, 2012). The NEPA process should not be a mechanism to supersede the permitting decisions and regulatory authority and expertise of the agencies charged with issuing regulations and permits under the Clean Air Act to ensure that air emissions do not endanger public health and the environment.
BLM announced in its Notice of Intent that the NEPA review is "the first phase of a process that may lead to the amendment of the Hollister RMP (2006)." 78 Fed. Reg. 47,409. As CEQ explains in its NEPA regulations, "NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken." 40 C.F.R. § 1500.1(b). Consistent with this purpose, BLM must avoid prejudging whether any amendments to the 2006 RMP are necessary. While it is important for BLM to consider the potential effects that advances in horizontal drilling and hydraulic fracturing may have on the scope and pace of oil and gas development in the Monterey Shale and in the area overseen by the Hollister Field Office specifically, this does not mean that amendment of the 2006 RMP is a fait accompli. For example, even if the reasonably foreseeable well development scenario is increased, BLM could conclude at the end of its NEPA review that the results of recent studies- as well as the changes taking place as a result of new BLM and California regulations- suggest that no additional conditions or safeguards are needed as part of the RMP. Rather than prejudging that more oil and gas development requires additional regulatory oversight (or even that more oil and gas development will occur), BLM must await the completion of the EIS in order to make an informed decision on whether amendments are necessary.
The BLM recognizes the need to update current rules regarding O&G development on public lands, due to increased concern over the use of alternative well stimulation techniques, such as fracking and acidizing, and their impacts on public health and the environment. The EIS will reflect public comments and additional information not found in current regulations - resulting in new analyses of impacts and proposed mitigation measures. Because of this, no new wells should be allowed in California's public lands until a Final Environmental Impact Study (FEIS) is completed.
The EIS for which the Hollister BLM office is now conducting scoping will specify which areas of federal public lands are opened or closed to oil and gas leasing and it will also prepare a list of stipulations to be applied to future leases to protect natural resources. If the Resource Management Plan prepared for the Hollister District is applied to other BLM management areas, then this needs to be made clear and specific well in advance of the release of any EIS documents or related research reports
The EIS must accurately assess the impacts predictable if a large oil "play" begins and financial and political pressure mounts upon your agency to lease ever---larger areas of land. The decisions of whether to sell hydraulic fracturing leases at all, and if so, where and how to permit any unconventional oil and gas extraction (fracking) on public BLM lands and mineral estate in California is a major determination that requires your agency to conduct a thorough and honest assessment of a full range of environmental impacts. The Sierra Club is particularly interested in how areas might be selected as suitable for oil and gas leasing, why and based upon what principles such determinations will be made, and if the information used to make these decision is consistent with the fundamental issues defined by NEPA.
The purposes of the National Environmental Policy Act are as follows: (1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings; (3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

Table C-3
Issues Inside Scope – Already Addressed Under Existing Policies, Plans, and Legislation

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The objectives of a NEPA scoping process are to:

(1) Identify potentially interested parties;

(2) Identify public and agency concerns

(3) Define the range of issues that will be examined in the plan

(4) Ensure that relevant issues are identified early and drive the analysis; and

(5) Establish a public record. The full public record must be made readily available on a website and that web address must be easily available to the public.

All reasonable alternatives to oil and gas leasing must be evaluated objectively. These alternatives must receive the full attention of BLM in detail.

The comparison between differing alternatives must, at minimum assess:

(1) Direct effects and their significance;

(2) Indirect effects and their significance;

(3) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned;

(4) The environmental effects of alternatives including the proposed action;

(5) Energy requirements and conservation potential of various alternatives and mitigation measures;

(6) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures;

(7) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures;

(8) Means to mitigate adverse environmental impacts.

As described in the NOI, the proposed Environmental Impact Statement ("EIS") is unusual, in that it is not related to a proposed Resource Management Plan ("RMP"), lease sale or permit to drill, or to any other presently proposed "major federal action" subject to review under the National Environmental Policy Act ("NEPA"). The NOI states that it represents the first phase of a "planning process" that may lead to the subsequent amendment of the 2006 Resource Management Plan ("RMP") and, potentially, to amendment of other RMPs. However, no proposed RMP amendment is referenced in the NOI.

Table C-4
Issues Outside of Scope – Resolved through Policy

Develop a construction traffic and parking management plan that maintains traffic flow and plan construction to minimize vehicle trips.
A critical component of the scoping process is distinguishing between those impacts that are significant and those which are insignificant. See CEQ Guidance, 77 Fed. Reg. at 14,477 ("The scoping process provides a transparent way to identify significant environmental issues and to deemphasize insignificant issues, thereby focusing on the most pertinent issues and impacts."). Once the scoping process is complete, "NEPA documents must concentrate on the issues that are truly significant to the action in question. . . ." 40 C.F.R. § 1500.4. To the extent that it determines that supplemental analyses are required for any of the issues identified in the Notice of Intent, BLM should ensure that it limits its analysis to significant issues, in part by avoiding consideration of issues that are subject to the expertise and regulatory oversight of other agencies. Extensive analysis of such issues would prove counterproductive as BLM's resources would be spent on issues that are beyond its regulatory authority. Instead, BLM should support the technical and policy decisions of other expert agencies to the extent that their areas of expertise arise in the NEPA process. First, BLM should exercise caution as it considers "the environmental effects of chemicals, if any, used." 78 Fed. Reg. at 47,409. The Industry Associations understand that the content of hydraulic fracturing fluid is an issue of interest for regulators and stakeholders, and have supported the development and use of FracFocus as a way to communicate information about the content of fracturing fluid to the public. Many states already require some form of post-treatment disclosure of additives used in fracturing fluids- some through FracFocus- although valid trade secrets are typically exempted. In California, S.B. 4, which was signed by Governor Brown on September 20, 2013, requires DOGGR to develop disclosure regulations by January 15, 2015. See Cal. Pub. Res. Code § 3160(a)(7)(2). BLM's proposed hydraulic regulations would also require such post-treatment disclosure. See 78 Fed. Reg. at 31,677. In light of the agency's position regarding disclosure, there is nothing left for the EIS to consider.
Last, BLM should also refrain from duplicative and unnecessary reviews of surface and groundwater withdrawals and water quality, as these issues are regulated and permitted by other expert state and federal agencies, including the EPA. BLM's analyses should, at most, rely on and incorporate those agencies' prior guidance and information, and BLM should refrain from proposing additional limitations, mitigation, or restrictions on water resources. Likewise, BLM should refrain from unwarranted analysis of impacts to threatened and endangered species for which legal responsibility lies with other expert agencies.
The Department is currently processing a project-level Environmental Impact Report (EIR) in conjunction with an amendment to Chapter 19.98 (Gas and Oil Production) of the Zoning Ordinance. The EIR will cover all oilfield activities and result in development standards and mitigation measures on oil exploration and projection activities. The final EIR may also be used by the Department of Oil, Gas, and Geothermal Resources (DOGGR) in their permitting. The final local permit will remain ministerial and there will be no Conditional Use Permit or public hearings required for normal oil and gas activities. The project's Notice of Preparation is anticipated to circulate in late August 2013 and the draft EIR is projected to circulate in the spring of 2014. Please be advised that BLM will be provided the opportunity to comment on the Department's Oil and Gas Amendment NOP and EIR once completed and circulating for agency/public comment.
In addition to completing an EIS for the Hollister Field Office, BLM announced that it is "concurrently initiating a separate peer-reviewed interdisciplinary assessment of the current state of industry practices for well completion and stimulation in California." 78 Fed. Reg. at 47,409. The study is wholly unnecessary as BLM has already conducted a thorough assessment of industry practices related to hydraulic fracturing in association with its proposed rulemaking and other NEPA analyses. Further, such a study is now going to be undertaken by the State of California, and another study would add unnecessary delay and is contrary to BLM's duty under the MMPA to promote the development of shale oil resources. See 30 USC. §21a. The Industry Associations strongly urge EPA to reconsider its decision to initiate a separate, peer-reviewed study of hydraulic fracturing concurrently with its NEPA analysis. First, an "assessment of well completion and stimulation practices" is wholly unnecessary and excessively broad. BLM has been actively engaged in assessing hydraulic fracturing for some time, and an additional peer-reviewed analysis would be redundant and wasteful. BLM recently addressed the same issues related to horizontal drilling and hydraulic fracturing in association with its proposed rulemaking for hydraulic fracturing on federal lands. In addition, it has completed at least four other NEPA analyses related to hydraulic fracturing over the past several years. These studies have provided BLM with a robust understanding of current industry practices for horizontal drilling and hydraulic fracturing. Additional analysis would waste time and resources, and go far beyond the court's narrow holding in CBD v. BLM.

Table C-4
Issues Outside of Scope – Resolved through Policy

Moreover, there is no need for additional peer review of BLM's analysis. Each of BLM's analyses to date has been subject to intensive review during the public comment period. BLM received so many detailed and constructive comments in response to its initial rulemaking proposal for hydraulic fracturing that the Bureau withdrew the proposed rule and, after incorporating information from the public comment period, issued a second proposal earlier this year. Likewise, BLM's analyses with respect to this NEPA review will again be subject to notice and comment, where the public will have every opportunity to submit comments and data on the content of BLM's EIS. Further, as described above, extensive studies addressing the potential environmental impacts of hydraulic fracturing have already been completed and the Bureau is more than capable of assessing these studies without the assistance of an outside panel.

The Industry Associations are also aware that the State of California, pursuant to the recently enacted S.B. 4, will conduct "an independent scientific study on well stimulation treatments, including ..hydraulic fracturing treatments." S.B. 4, signed into law on September 20, nearly two months after BLM published its Notice of Intent, provides yetanother reason why BLM should conduct a limited environmental review and should not proceed with an additional study of hydraulic fracturing. It is hard to gauge what environmental or public health benefits, if any, could accrue on the basis of nearly simultaneous, surely overlapping and duplicative, and potentially conflicting or contradictory studies of the same well stimulation technique in the same geological formations. If anything, BLM should collaborate with the State of California to provide their insight and experiences in overseeing hydraulic fracturing on federal lands for decades, not launch yet another federal inquiry into an activity with a long safety record confirmed by recent Department of Interior ("DOI") research and former and current DOI and BLM officials.

Finally, concurrently conducting a peer reviewed, independent assessment of horizontal drilling and hydraulic fracturing has the potential to dramatically delay BLM's NEPA analysis. As described above, consistent with direction from CEQ, BLM should make every effort to complete its NEPA analysis within one year. However, that will be extremely difficult if BLM must wait in order to allow this assessment to inform its views. Given the amount of time it will take for an advisory body to complete an assessment and seek peer review, it will be virtually impossible for the study to be completed in time for BLM to meet a one-year deadline after considering the outcome of the assessment. Alternatively, if BLM completes its NEPA analysis without waiting for the results of the peer-reviewed assessment, that assessment would be rendered moot. Thus, to avoid unnecessary delay in the NEPA analysis, BLM should withdraw its plan to initiate a separate assessment of horizontal drilling and hydraulic fracturing.

As BLM completes its NEPA review for the Hollister Field Office, the Industry Associations urge the Bureau to remain mindful of the limited scope and impact of its decision-making process while the EIS is ongoing. The NEPA process is intended to produce informed decision making and, therefore, must necessarily precede any decisions that alter the status quo in the interim. Specifically, BLM must defer any decision with respect to the 2006 RMP until after the NEPA process is complete. However, to the extent that BLM chooses to reconsider resource goals and objective planning criteria for the development of oil and gas resources, we urge the Bureau to consider expanding those goals and criteria to encourage oil and gas development in the Monterey Shale.

BLM's science review will be led by the California Council on Science and Technology ("CCST"), which BLM claims is an independent third party. BLM should make public and available for comment its assessment of CCST's ability to act as an independent third party. If it did not conduct such an assessment, it should do so immediately.

The group chosen to lead the science review must include individuals with extensive knowledge not only of the science and business aspects of oil and gas extraction, but also with a background in ground and surface water quality, air quality, fish and wildlife habitat, and human health and safety. However, those with a current financial stake in companies involved in fracking cannot possibly be considered objective participants in such a study. CCST's members include Patrick Lee, a senior vice president at Southern California Gas Company, a subsidiary of Sempra Energy. Both companies have substantial economic interests in energy development. Mr. Lee is responsible for customer service at Southern California Gas Company, "as well as strategic planning and development of new businesses and technologies."

If Mr. Lee cannot or will not recuse himself from participation in the science review, BLM should seek a different organization that is free from economic conflicts of interest to lead the review.

In addition, BLM must address conflict-of- interest issues involved in having CCST lead its science review. Finally, the planning process should reflect the fact that increasing oil and gas extraction is not in the public interest, and that the focus should be redirected toward reducing demand and developing renewable energy alternatives.

Table C-4
Issues Outside of Scope – Resolved through Policy

The BLM's public lands moratorium is especially important, since Governor Brown recently signed SB 4, the dangerous and misguided bill that green-lights massively expanded fracking in California. We need our local governments and the federal government to step in and protect us from fracking.

Table C-5
Scope of the EIS

It is paramount that BLM fully assess each stage of the lifecycle of unconventional oil and gas development, from drilling to the end use of extracted oil and gas. Ignoring any stage would result in an incomplete understanding of the harms.
The EIS and Statewide Study Should Examine All Methods of Unconventional Resource Extraction. The EIS should encompass all methods of unconventional oil and gas extraction and production. Although hydraulic fracturing has been the primary focus of the litigation prompting this review and has garnered the most attention from the public, well stimulation and underground injection techniques can vary widely. Examples include acidization, acid hydraulic fracturing, and gravel packing. Each of these techniques raises a unique yet dangerous set of concerns and potential impacts on human health, safety, and the environment. The EIS and Statewide Study must address all types of unconventional oil and gas recovery that may be utilized in California.
The EIS and Statewide Study Must Examine All Aspects of Unconventional Resource Extraction BLM must analyze the whole of these actions, tracking the complete impacts of the complete lifecycle of activity. Unconventional oil and gas extraction techniques do not occur in a vacuum, but rather along with all other aspects of oil and gas exploration and development. Moreover, unconventional oil and gas extraction techniques lead to exploration and development in new and previously undeveloped areas. It would make no sense- and be in violation of NEPA- to analyze hydraulic fracturing and other unconventional techniques apart from all other aspects of the exploration and development process. An increase in the use of unconventional techniques increases the types of risks and their severity associated with oil and gas development while simultaneously introducing those risks to new areas where previously such activity was considered infeasible or uneconomical.
BLM must analyze not only the well completion or stimulation, but also the various preceding, concurrent, and subsequent activities that surround oil and gas extraction. Oil and gas leases affect the environment not only through the well stimulation and recovery processes, but also through related activities needed to drill, construct, operate, maintain, monitor, and shut down each well. Each stage of the oil and gas extraction and recovery process carries its own set of public health, safety, and environmental concerns.
The EIS and Statewide Study should cover not only the particular method of extraction, but all aspects of exploration and development, including but not limited to: drilling rig mobilization, site preparation, and demobilization; completion rig mobilization and demobilization; well drilling; well completion; and well production. Equipment cleaning, maintenance, and repair also become necessary and necessitate additional chemical use and expand the risks from exposure.
Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.
In addition, the EIS and Statewide Study should assess the impact of refining and burning the newly accessible supply of oil and gas. Allowing unconventional oil and gas recovery would increase need for refineries as well as the total amount of oil and gas available for consumption. The US Energy Information Administration ("EIA") estimates that the Monterey Shale contains over 15 billion gallons of oil. End-users who burn this oil will be polluting the air with many different air pollutants, not the least of which is carbon dioxide, the leading contributor to global warming. The EIS and Statewide Study will be incomplete without assessing the effects of harmful air emissions from burning the fuel that would otherwise remain underground. In particular, the amount of carbon dioxide emitted as a result of oil and gas produced through unconventional extraction methods will lead us further toward irreversible and catastrophic climate change. Oil and gas extraction also emits a substantial amount of methane, a powerful greenhouse gas that will contribute significantly to the climate warming footprint of oil and gas activity.
In short, the entire lifecycle of oil and gas development and consumption must be included in the EIS and Statewide Study. And because unconventional techniques open new lands and federal minerals up to production, each of these harms may extend far beyond the state's current inventory of oil and gas development sites. BLM must assess the full impact of these environmental harms in which development expands to public land that previously could not be considered for production.

Table C-5
Scope of the EIS

The EIS and Statewide Study Should Analyze All Chemicals Used in Oil and Gas Production
Congress charged BLM with managing public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." BLM will not be able to adequately assess the environmental impacts of unconventional oil and gas recovery and fulfill these duties without full knowledge of the chemicals used in the process. To date, operators have been unwilling to disclose a full list of chemicals used in new techniques that involve injection of toxic chemicals underground. While some chemical ingredients are known through Material Safety Data Sheets and other sources, many are withheld from public disclosure under claims of trade secret protection. But BLM is not precluded from requiring the submission of such information. In fact, BLM is required to gather and disclose chemical information under the statutory mandates in NEPA, Federal Land Policy and Management Act, 42 USC. § 1701 et seq. ("FLPMA"), and other applicable law.
The federal Trade Secrets Act, which BLM has interpreted as a restriction on disclosing chemical information to the public in the context of BLM's proposed rules for hydraulic fracturing, does not in fact place such restrictions on an agency. BLM has the authority to create regulations that permit disclosure of information even for information that would otherwise be considered a trade secret. Given BLM's statutory duties to fully disclose the environmental damages from its actions, as well as to prevent unnecessary and undue degradation of public lands, the collection and disclosure of crucial information is well within the contemplation of the grant of legislative authority under the FLMPA. Thus, BLM has the obligation to collect such information and make it publicly available.
The EIS and Statewide Study should examine the chemicals that are being injected underground as well as the chemicals that flow back to the surface. Full information on all substances that flow back up to the surface will allow BLM to identify harms particular to flowback fluid. Flowback fluid is comprised of a different mixture of chemicals because some naturally occurring, yet dangerous, chemicals that were previously contained in the subsurface will rise to the surface. These include heavy metals, salts, and naturally occurring radioactive materials ("NORMs"). Conversely, some chemicals may be more likely to remain underground and pose threats to underground water supplies and increase the risk of induced seismic activity. It is important to understand how different chemicals travel and mix throughout the extraction process in order to adequately identify particular risks
New technology and techniques rely heavily on harmful chemicals to achieve high rates of production. The chemicals serve a variety of purposes during the process, and BLM should assess all of the chemicals used for each purpose. Well stimulation alone uses chemicals for a variety of functions, such as: dissolving acids, biocides, breakers, clay stabilizers, corrosion inhibitors, crosslinkers, foamers and defoamers, friction reducers, gellants, pH controllers, proppants, scale controllers, and surfactants.
In addition to well stimulation process, chemicals are also used in other stages of oil and gas production. For example, a study found 22 chemicals used in the drilling process in Colorado gas development fields. Chemical dispersants might also be used in the event of a spill or other accident. These dispersants may be just as harmful as the spill itself. Another example is the discovery of methylene chloride being used as a cleaning solvent for equipment. This chemical was found in 73 percent of air samples in one study, but methylene chloride was not reported on any list of disclosed chemicals, despite its toxicity. The discovery of an undisclosed, harmful, and pervasive chemical underscores the need for BLM to conduct its own monitoring and measuring and not simply relying on reports from operators. Meaningful monitoring is made impossible when compounds used are unknown. Furthermore, contaminants cannot be traced back to their source if operators do not disclose which chemicals they use. Thus, anything short of full disclosure with regard to chemical information will violate NEPA and other applicable law while endangering public health and safety.
As for chemicals known to have been used in hydraulic fracturing, the list is as long as it is dangerous. A study of gas production in Colorado yielded 632 chemicals used in 944 different products. Of these chemicals, 75 percent have been shown to cause harm to the skin, eyes, and other sensory organs; 37 percent could affect the endocrine system; and 25 percent could cause cancer and mutations. Recent disclosure requirements adopted by the South Coast Air Quality Management District ("SCAQMD") in California revealed that operators engaged in unconventional oil and gas extraction in southern California, in just 30 days of reporting, used dozens of chemicals known to be air toxics over hundreds of occasions. BLM cannot complete an EIS or Statewide Study without understanding and documenting the full extent of the harms from each and every chemical used in the oil and gas extraction process. This applies to both known and currently unknown chemicals. It is thus important for BLM and the public to know the full array of chemicals used in the extraction process.

Table C-5
Scope of the EIS

In short, knowing the exact identities, quantities, concentrations, and migration paths of all chemicals will help BLM determine the scope and extent of risks to human health, safety and the environment. Incomplete knowledge in these areas will result in an inadequate EIS and Statewide Study.

The EIS and Statewide Study should incorporate BLM's own literature review of the harmful effects of each of these chemicals known to be used in hydraulic fracturing and other unconventional oil and gas extraction methods. Without knowing the effects of each chemical, an EIS or Statewide Study cannot accurately project the true impact of unconventional oil and gas extraction on public lands.

Given the possible expansion of the use of hydraulic fracturing in California- most notably to the lands that overlay the Monterey Shale formation - the EPA strongly supports the BLM's decision to prepare an EIS that analyzes the effects of hydraulic fracturing and other oil and gas drilling activities in the area administered by the Hollister Field Office. The scope of subjects that EPA recommends be included in the DEIS is described in the enclosed detailed comments. Topics include air quality, water resources, climate change, vegetation and wildlife, cumulative impacts, environmental justice, tribal consultation, public health and safety and induced seismicity. We also recommend that the DEIS discuss the connection between the Hollister Field Office analysis of hydraulic fracturing and the BLM statewide study announced in a federal court filing on September 16th, 2013.

The oil and gas sector has utilized hydraulic fracturing in California for decades. It's possible expansion, however, especially to the lands that overlay the potentially rich oil reserves of the Monterey Shale formation, present a management challenge, to both state and federal regulators, to proactively plan for this possible boom. The EPA recommended - in comment letters submitted in 2011 for Draft EISs developed for the Bakersfield and South Coast resource management plans - that the BLM prepare for this possible expansion by assessing the scope of, and potential impacts associated with, hydraulic fracturing activities in the Monterey Shale region. We are pleased to see that an analysis will be conducted of the use ofhydraulic fracturing in oil and gas operations within the Hollister Field Office. We are aware that the BLM is also undertaking a statewide study ofhydraulic fracturing in California, which was announced in a federal court filing on September 16, 2013, and that the State is conducting an assessment pursuant to California's well stimulation permitting law, SB 4.

Recommendations:

- The Hollister Field Office should coordinate with the teams that will prepare the statewide hydraulic fracturing assessments, for both the BLM and State of California, to inform the analysis and alternatives developed for the Hollister DEIS.

- The DEIS should describe the connection between the Hollister Field Office analysis of hydraulic fracturing and the BLM statewide study.

A general evaluation of the geographic scope of the impact area and identification of minority, low-income, and tribal communities within that scope.

We request that a Scoping Report be circulated at a later date with a request for additional public comments, OR that BLM revise and recirculate the entire NOI for further comments.

General Comments include:

Project Description must include all Oil and Gas (O&G) Exploration and Production (E&P) Facilities and Operations within any BLM Areas;

RMP - Prepare a Progammatic RMP for California/Statewide O&G-E&P facilities and operations in any BLM areas, with detailed tiered-RMP for the Hollister Area;

EIS - Prepare a Progammatic EIS for California/Statewide E&P RMP(s) with detailed tiered-EIS for the BLM Hollister Area RMP;

"Studies" - Provide all supporting efforts and documents and include in appendices for RMP and EIS and in searchable web-accessible documents;

"Terms" - Provide section of Definitions, Glossary, and Acronyms to be consistently and comprehensively applied throughout all documents, for example "development" for BLM-RMP is different from E&P "development" and O&G refers to an industrial sector including refining and retailing which I don't believe are covered in the BLM definition of O&G;

Table C-5
Scope of the EIS

Inter-/Intra-Agency Coordination - A statewide workshop(s) to establish a regulatory program.
First, BLM must ensure that the EIS is conducted in an efficient and timely manner. Oil development in the Monterey shale offers significant economic and energy security benefits that will be facilitated if BLM establishes a schedule to complete its EIS in the next twelve months and appropriately limits its analysis to the specific concerns over horizontal drilling and hydraulic fracturing that the court identified in the recent NEPA challenges.
Second, BLM should streamline its NEPA analysis to the fullest extent possible. BLM can do that by relying on existing BLM NEPA analyses covering the same issues, by avoiding consideration of issues subject to regulation by other agencies, by incorporating existing studies and guidelines from third parties, and by considering the effects of other ongoing regulatory processes that will affect the scope of oil and gas development in the Hollister Field Office.
Third, BLM should reconsider its proposal to initiate an independent, peer-reviewed assessment of horizontal drilling and hydraulic fracturing. Ample efforts in this area have been undertaken and are being conducted by multiple agencies and academic institutions across the United States. A further peer reviewed study would merely result in undue duplication of effort.
Fourth, BLM should not reopen broad policy issues related to the resource goals and objective planning criteria that were adopted for the Hollister Resource Management Plan ("RMP") in 2006. Instead, BLM should build upon the RMP and not redo the analysis completed there.
BLM Should Use the Scoping Process to Narrow the Issues under Consideration and Avoid Reopening Issues that Were Resolved in the 2006 RMP Establishing the appropriate scope for an EIS is a critical aspect of the NEPA process and, when used effectively, can focus and streamline an agency's analysis. See CEQ Guidance, 77 Fed. Reg. at 14,477 ("The scoping process provides a transparent way to identify significant environmental issues and to deemphasize insignificant issues, thereby focusing on the most pertinent issues and impacts."). While it is important for the agency to use the scoping process to identify significant issues, the identification and elimination of extraneous issues is just as critical to ensuring an efficient and expedient NEPA review. An important part of this scoping process is to identify environmental impacts that have already been addressed in prior NEPA analyses and, therefore, need not be revisited. See 40 C.F.R. §1501.7 (As part of the scoping process, an agency must "[i]dentify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (§ 1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect or providing a reference to their coverage elsewhere." (emphasis added)). Here, the primary question that BLM must answer is whether "various current or reasonably foreseeable well completion and stimulation practices, including hydraulic fracturing and the use of horizontal drilling" may require an amendment to the 2006 Hollister RMP or to the reasonably foreseeable development scenario for lands overseen by the Hollister Field Office. 78 Fed. Reg. at 47,408. This is the only question that arose out of the court's order on liability in CBD v. BLM, Case No. 11-6174 (Mar. 31, 2013 N.D. Cal.), and the scope of the EIS should be limited to the NEPA deficiencies identified by the court. In that decision, the court focused on the reasonably foreseeable well development scenario included in the 2006 RMP, finding that the RMP failed to account for the recent expansion of hydraulic fracturing in combination with horizontal drilling. CBD v. BLM, slip op. at 21-24. As a result, the Court found that BLM failed to adequately assess three of the so-called "intensity factors" that an agency is required to address under NEPA. Id. at 24-28; see also 40 C.F.R. § 1508.27 (listing the eight intensity factors). While the Environmental Assessment ("EA") conducted by BLM for the lease sale tiered from the 2006 RMP and relied heavily on its environmental analysis, the Court did not question any other aspect of the 2006 RMP. In light of the court's narrow holding in CBD v. BLM, the Industry Associations urge BLM to adopt an equally narrow scope for its NEPA analysis by focusing on the ways in which the combination of hydraulic fracturing and horizontal drilling since 2006 have altered the reasonably foreseeable well development scenario for the Hollister Field Office, along with any potential associated environmental impact. BLM should resist any suggestion to reopen and consider amendments to any additional portions of the 2006 RPM that were not called into question by the court's decision. In the absence of any indication that an issue would be called into question by a change in the reasonably foreseeable well development scenario, BLM should simply note in the EIS that these issues were covered by BLM's prior environmental review of the Hollister Field Office in conjunction with the 2006 RMP and will not be reopened.
In the Notice of Intent, BLM requests comment on a preliminary list of issues that includes "surface water, groundwater, and air quality; greenhouse gases and climate change; the environmental effects of chemicals, if any, used; the potential for induced seismicity; endangered and threatened species; public health and safety; and socioeconomics." 78

Table C-5
Scope of the EIS

Fed. Reg. at 47,409. This list is unnecessarily expansive, and an entirely independent evaluation of each issue would take a significant amount of time and strain the Bureau's resources. Instead, in accordance with CEQ and BLM regulations and guidance, we urge BLM to narrow the scope of the EIS by tiering to, incorporating by reference, or otherwise relying on existing BLM analyses, industry guidelines, and state and federal regulations that have already- and thoroughly- addressed the issues that BLM is contemplating here. In addition, we urge BLM to rely to the fullest extent on existing scientific literature that has addressed these issues.

Reliance on existing analyses and documents provides an invaluable tool for streamlining the NEPA process. See 40 C.F.R. §§ 1502.20 (tiering); 1502.21 (incorporation by reference). CEQ guidance recognizes that "[s]coping, incorporation by reference, and integration of other environmental analyses are additional methods that may be used to avoid redundant or repetitive discussion of issues." CEQ Guidance, 77 Fed. Reg. at 14,476; see also id. at 14,476 ("NEPA reviews should coordinate and take appropriate advantage of existing documents and studies, including through adoption and incorporation by reference."). Likewise, BLM's implementing regulations require the agency to use these techniques to narrow the scope of EISs. 43 C.F.R. § 405 ("To the extent possible, bureaus should use techniques such as incorporation of referenced documents into the NEPA analysis (46.135) and tiering (46.140) in an effort to remain within the pages limits stated in 40 CFR 1502.7."). The amount of available information related to hydraulic fracturing and horizontal drilling is expanding rapidly, and there is ample opportunity for BLM to rely on and incorporate this information to narrow and streamline the NEPA process.

BLM regulations and guidelines recognize that existing NEPA analyses are often the best resources for streamlining NEPA reviews and direct responsible officials to "make the best use of existing NEPA documents by supplementing, tiering to, incorporating by reference, or adopting previous NEPA environmental analyses to avoid redundancy and unnecessary paperwork." 43 C.F.R.§ 46.120(d); see also BLM, Environmental Quality Programs, 516 DM 11.4.A, 11.6. Here BLM should rely on the existing 2006 RMP and existing EPA analyses of horizontal drilling and hydraulic fracturing that the Bureau has completed in recent years. Through these analyses, BLM has already assessed potential environmental impacts associated with horizontal drilling and hydraulic fracturing which will be equally applicable to its consideration of these activities in the Hollister Field Office and in the Monterey Shale generally.

First, BLM should rely to the greatest extent possible on the existing 2006 RMP for the Hollister Field Office.5 This RMP, in coordination with the Memorandum of Understanding ("MOU") between BLM and the California Department of Conservation Division of Oil, Gas, and Geothermal Resources ("DOGGR"), has provided a workable means of managing and promoting oil and gas development on federal lands in California in accordance with the MMPA and BLM's multiple use mandate. BLM should continue to rely on these documents, which assess the environmental impacts associated with oil and gas development in California and provide necessary safeguards to ensure responsible oil and gas development, to the fullest extent possible. Very few of the analyses or conclusions in these documents have been affected in any material way by advances or changes in hydraulic fracturing and horizontal drilling. Thus, aside from any changes or analyses that are compelled by the court's decision in CBD v. BLM, BLM should incorporate by reference the NEPA analyses that accompanied the RMP. In addition to streamlining the NEPA process, this will promote the continued cooperation with DOGGR by avoiding unnecessary conflict with the MOU that BLM has already negotiated based on the existing RMPs.

Second, for specific issues related to hydraulic fracturing and horizontal drilling, BLM should look first to existing NEPA analyses that the agency has conducted. For example, BLM recently conducted an Environmental Assessment in connection with its proposed hydraulic fracturing regulations. That analysis addresses many of the same issues that BLM intends to review here. In addition, BLM has recently conducted EISs for a number of projects involving hydraulic fracturing and horizontal drilling, including the Pinedale Anticline Oil and Gas Exploration and Development Project in Wyoming, the West Tavaputs Plateau Project in Utah, the Gasco Energy Inc. Uinta Basin Natural Gas Development Project in Utah, and the Greater Natural Buttes Project in Utah. In particular, the Gasco Energy FEIS provides a detailed analysis of "Potential Impacts from Hydraulic Fracturing" which BLM could incorporate by reference into its EIS for the Hollister Field Office. See Gasco Final EIS at 4-340. Thus, while BLM may need to address some exclusively local issues in this EIS, the Bureau's experience with hydraulic fracturing should encourage reliance on existing NEPA analyses to addressalmost all of the issues identified in the Notice of Intent. Such reliance would also assure consistency in the agency's management of oil and gas operations across administrative regions.

In the event that BLM decides- now or after the EIS is complete- to amend the 2006 RMP, it should adhere to its current plan to "retain the existing condition goals and objectives in the Hollister RMP." 78 Fed. Reg. at 47,409. This existing goal for energy development in the RMP "balances the resource conservation and ecosystem health with the production of commodities and with public use of the land." Draft RMO 2-1 (Alternative C). According to the RMP, this would "provide opportunities to produce commodities from natural resources and to use the land for public purposes on a sustainable basis while maintaining key ecological, visual, and recreational values." Id. BLM

Table C-5
Scope of the EIS

should not reopen these core goals and objectives to debate.

Indeed, nothing in the court's decision in CBD v. BLM calls into question the 2006 RMP's resource goals and objectives. Rather than questioning BLM's broad policy goals and objectives, the court's decision focused on specific factual deficiencies regarding the number of oil exploration and development wells that BLM projected would be completed on the leased lands. This deficiency can be remedied in a simple, straightforward manner without implicating the broader policies at issue in the resource objectives and goals. Thus, reopening this issue would add needless complexity to BLM's task-particularly if it occurs as a part of the EIS process.

BLM's announcement describes the planning process as addressing oil and gas development on public lands and the federal mineral estate in the Hollister Field Office. BLM should enlarge the scope of its planning process to ensure that it studies all lands - both public and private- where wells may be fracked in California, and revises all relevant RMPs to address the cumulative effects of this activity. Fracking takes place throughout California - not only on lands within the Hollister Field Office's jurisdiction. For example, the website Fracfocus.com, which only includes voluntarily reported fracking operations, shows that wells have been fracked in many areas beyond the Hollister Field Office's jurisdiction, such as Kern, Los Angeles, Colusa, Sutter, Ventura, Glenn, and Kings counties. While much of the discussion about fracking has focused on the Monterey Shale, this voluntary reporting shows that fracking is happening throughout California. For example, Glenn, Colusa, and Sutter counties are situated more than 100 miles north of the Monterey Shale formation.

BLM's announcement indicates that the agency "may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development (Bakersfield, Palm Springs-South Coast, Mother Lode, and Ukiah)." BLM should include those four areas in its planning process. In addition, since fracking technology continues to evolve, areas with oil and gas deposits that do not seem promising now may become more attractive for fracking development in the future. Therefore, the planning process should be statewide. That process should address as well the fact that fracking contributes to global warming and consequently is not in the public interest as discussed in section E below.

The planning process and science assessment are a first step toward addressing the impacts offracking in California. However, the scope of the planning process must be enlarged to address all lands potentially vulnerable to fracking, and the RFD scenarios must be updated to reflect the current state offracking technology.

All geographic areas that could be negatively impacted by proposed activities. If the EIS cannot address the entire geographic area potentially affected by the proposed activities those activities should not be allowed.

We believe that the geographic scope of the proposed Hollister Field Office Environmental Impact Statement (EIS) is too narrow. In the Hollister notice, BLM implicitly acknowledges the need to examine the effects of oil and gas leasing more broadly: "The BLM may also use this process to consider amending RMPs for other field offices in California with oil and gas leasing and development.."

At a minimum, BLM should conduct an EIS for all BLM-administered lands and sub-surface resources in California, analyzing both its oil and gas leasing practices and the full extent of its associated impacts, rather than limiting the scope to the area under the management of the Hollister field office.3 BLM manages 15 million acres of surface and 47 million acres of mineral estate in California. A recent DOE Energy Information Agency report projected that California's widespread Monterey shale formation may contain as many as 13.7 billion barrels of technically recoverable oil. The agency will undoubtedly have under future consideration- as it does now in the Hollister area- many leased areas where the development target is the Monterey shale, and where new well drilling practices and stimulation methods, including hydraulic fracturing and horizontal drilling, will be proposed. We support BLM's accompanying proposal to conduct an independent scientific review of the impact of well drilling practices in California, and that study should extend state- wide as well.

Both the Hollister EIS and the BLM scientific review should be closely coordinated with the new programs and scientific and technical reviews required by California's Senate Bill 4, recently signed into law by Governor Brown. In the past, BLM has accepted and applied State regulatory programs to federal oil and gas leases in addition to the federal requirements. We believe that it is appropriate to reexamine the nature of the state-federal relationship in oil and gas development in light of changes in regulatory standards and drilling practices.

Table C-5
Scope of the EIS

The 2010 Environmental Assessment for the recently challenged Hollister field office leases proposed for Fresno and Monterey Counties stated:

BLM's 2008 MOU with CDOGGR agrees to apply State regulations for oil and gas drilling to applications for permits to drill on Federal mineral estate to prevent surface and groundwater contamination and ensure protection of sensitive resources However, BLM and CDOGGR both consider hydraulic fracturing to be a "routine" drilling operation, so there are no special regulations for the use of this technology on private or Federal mineral estate in California.

We believe that hydraulic fracturing can no longer be regarded by either state or federal authorities as a routine drilling operation; the practice must be fully evaluated in accord with the requirements of both NEPA and SB 4's new provisions. In the Hollister EIS notice, BLM proposed to conduct a peer reviewed independent scientific assessment of industry well stimulation and completion practices in California. This analysis is of critical importance and should focus on state-wide practices and impacts. That study and the federal EIS should be closely coordinated with the parallel state scientific study and Environmental Impact Report required by SB 4, and any differences between state and federal study conclusions and regulatory approaches fully discussed and justified.

In an "EIS Planning Update" issued in January 2014, BLM more specifically describes potential amendments to the 2006 Hollister RMP. The EIS Planning Update states that the "need for the plan amendment is to incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends to update the reasonably foreseeable development scenario (RFD) and HFO Resource Management Plan (RMP). The decision to be made is to establish additional lease stipulations, conditions of approval, or best management practices to guide safe and responsible oil and gas development." However, any potential RMP amendment "will retain the existing resource condition goals and objectives in the Hollister RMP", as stated in the NOI, 78 Fed. Reg. at 47409.

In its 2007 Record of Decision, BLM adopted (with minor modifications) the preferred alternative from the 2006 Draft Hollister RMP and EIS, which incorporates the goal of "balanced resource conservation and ecosystem health with commodity production and public use of the land. . . . to provide opportunities for sustainable use of the resources while maintaining key ecological, visual and recreational values." Hollister RMP Record of Decision, p. i. WSPA concurs with the NOI's emphasis on retaining the existing goals and objectives. As such, WSPA believes that the EIS scope should not reopen consideration of the broad range of policy issues and environmental consequences already evaluated in the EIS for the Hollister RMP and adopted in the final RMP and Record of Decision. Instead, the EIS should build upon the RMP and prior EIS analysis, focusing on specifically on the effects of current and reasonably foreseeable well stimulation practices and an updated development scenario as stated in the NOI.

While the scoping process serves to identify significant issues, it is also designed to "identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review", to ensure an efficient and expedient NEPA review. 40 C.F.R. § 1501.7(a)(3). Considerable information on the potential impacts identified in the NOI, and mitigation measures for those impacts, is already available from existing scientific literature, prior NEPA reviews and other pertinent agency analyses, federal and state regulations, and industry guidelines and best practices. WSPA encourages BLM to rely on reliable existing information to the maximum extent possible, to help ensure consistency and avoid redundant effort and delay.

As BLM is aware, the California Natural Resources Agency, Division of Oil, Gas and Geothermal Resources ("DOGGR") is currently preparing its own Environmental Impact Report ("EIR") examining potential environmental impacts of well stimulation throughout the state, as directed by recent legislation. S.B. 4, Cal. Pub. Res. Code § 3161(b)(3). We urge BLM to coordinate with DOGGR, as well as with Kern County and other local agencies that are conducting or have conducted environmental reviews of oil and gas developments. Utilizing information developed in these EIR processes, to the maximum extent possible, again will help to ensure consistency and avoid redundant effort and delay.

The EIS should also be consistent with the court's order in Center for Biological Diversity v. Bureau of Land Management (N.D. Cal., Case No. C 11-06174 PSG, March 31, 2013)("CBD v. BLM"). In that case, the court's primary concern was that BLM's Environmental Assessment for a lease sale should have updated the reasonably foreseeable development scenario from the Hollister RMP, to take into account potentially increased activity and environmental consequences from advances in well stimulation practices. Consistent with the court's order, the NOI indicates that the "EIS will further analyze a potential update to the reasonably foreseeable development scenario." In this context, we again urge coordination with DOGGR, which is developing pertinent information and assumptions on projected development activity for purposes of its S.B. 4 EIR that could be used to update the scenario in Appendix F of the Hollister RMP.

Table C-5
Scope of the EIS

The NOI and EIS Planning Update both solicit comments on the geographic scope of the EIS. Given that BLM contemplates relying on this EIS for potential amendments to the Hollister RMP, the appropriate scope should be the same as that of the EIS for the RMP. Moreover, as acknowledged in the 2006 RMP EIS, p. 4.12-4, "Most of the exploration and development areas are expected to be adjacent to existing disturbed private lands such as existing oil fields." Accordingly, focusing the geographic scope on reasonably foreseeable development areas will improve the accuracy of the impact assessment.
Regarding mitigation measures, the EIS should consider the sufficiency of the oil and gas leasing standard stipulations and conditions described in Appendix D of the 2006 RMP EIS. The prior EIS identified these lease stipulations and conditions as mitigation measures for impacts, based on the reasonably foreseeable development scenario in Appendix F. The new EIS should follow the same basic approach in evaluating mitigation measures to address the updated development scenario, and should determine whether or not additional stipulations and conditions may be necessary. If so, as noted above, WSPA urges BLM to coordinate with DOGGR and other agencies, to utilize information developed in their EIR processes, including information on existing standards and best practices which may be relied on as mitigation measures for environmental impacts.
The NOI also states that, separate from the EIS, BLM is concurrently preparing a "peer-reviewed, interdisciplinary assessment of the current state of industry practices for well completion and stimulation in California" which will inform BLM's future NEPA evaluations for oil and gas lease sales. Here, again, WSPA encourages BLM to coordinate its effort with DOGGR, which is preparing a comparable scientific study as directed by S.B. 4, Pub. Res. Code § 3160(a).
Both the EIS and the peer-reviewed scientific assessment should be based on credible, peer-reviewed scientific literature. Even where definitive scientific evidence may be lacking or incomplete, unsupported speculations or assertions of advocacy groups should not be relied on as a basis for impact analysis. The Council on Environmental Quality's NEPA regulations provide guidelines for dealing with scientific uncertainties in an EIS. If complete information cannot be obtained, an EIS must state that information is incomplete or unavailable, explain the ways in which it would be relevant to evaluating reasonably foreseeable significant impacts, and provide both a "summary of existing credible scientific evidence" and "the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community." 40 C.F.R. § 1502.22. Thus, only credible and generally accepted science has a place in the proposed EIS. In addition, to ensure reliability for purposes of future NEPA reviews of oil and gas lease sales, the interdisciplinary assessment should follow the same approach.
Fossil fuel development results in many types of environmental damage. The various stages in development- site preparation, construction, drilling, well completion, oil production, transportation, waste disposal, oil refinement, and combustion by the end user- each come with environmental dangers. The EIS should study all stages and all types of oil and gas development, encompassing the entire lifecycle.
But fracking is just the tip of the iceberg in California. I'm even more concerned about matrix acidization, a process that is believed to be very effective for extracting fuel from the Monterey Shale. Good for oil companies, and bad for people. This technique involves pumping large quantities of hydrofluoric acid into the ground. Hydrofluoric acid dissolves glass and concrete. It also dissolves rock which is why oil companies find it useful. And it dissolves people, from the inside out. If you get it on your skin, it goes straight to the bone. We don't want truckloads of hydrofluoric acid going up and down the freeway.
The BLM should widen the scope of the EIS to include all oil and gas producing regions of California
Geothermal Fracking, better known as Enhanced or Engineered Geothermal Systems (EGS) must also be included in the BLM's studies regarding the environmental impacts associated with fracking. EGS is not a benign hydraulic fracturing process. For instance, in the Medicine Lake Highlands, (Glass Mountain KGRA, BLM leases) in Northern California, the geothermal developer's EGS solicitation to the DOE, included Halliburton Corporation injecting high pressure concoctions using toxic hydrochloric and hydrofluoric acids with other chemicals deep into the geothermal wells, in the hopes of stimulating a meager geothermal resource. The experimental EGS proposal was put on hold by the USFS due to the lack of environmental review and legal challenges.

Table C-5
Scope of the EIS

We also request that you thoroughly evaluate the full array of environmental and public health impacts of hydraulic fracturing and other unconventional oil, gas and geothermal extraction methods as part of your scoping for (1) the Environmental Impact Statement (EIS) on Oil, Gas and Geothermal Leasing on California Public Land, (2) the independent scientific study of fracking statewide, and (3) potential amendments to the Hollister Resource Management Plan (RMP).
Determining the proper scope of these studies is a critical step in assessing the true impact of oil, gas and geothermal activity on public lands. The scope of BLM's evaluation should include all types of unconventional oil, gas and geothermal recovery, including but not limited to hydraulic fracturing, acidization, and gravel packing. The studies should also include all stages and all aspects of oil, gas and geothermal recovery, from construction, drilling, and truck traffic to production, waste disposal, and the end use of extracted resources.
I would like to urge the BLM to continue the moratorium on fracking on California's public lands until more is known about it's consequences to the environment, specifically the public water supply that may be put at risk by the secret proprietary chemicals that the oil companies pump into the ground to break up the rocks to extract oil and natural gas. The oil companies won't make public exactly what's being used in the fracking process. My children drink water that may eventually contain these chemicals, if fracking is allowed to occur. If we, as citizens of California, are not allowed to know exactly what is being pumped into th eground so they can pump out oil and gas, then I don't think the oil companies should be allowed to go ahead with their fracking. We can't make informed decisions about the pros and cons without all the information. Keep the moratorium in place until we actually have all the facts. It's critical to the future of California's drinking water and the health of all of us
The side effects of fracking are not yet known- or maybe known to the companies doing the work, but they are certainly not volunteering the information. Damage to underground water supplies, poisoning farmland and wildlife, and long-term human health impacts have all been reported. Please do not allow these little understood risks to be forced upon Californians without more studies and safeguards. Once risks are identified, the companies doing the fracking should be obliged to pay for all remedies, such as increased health care costs, restoration of water supplies, etc.

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Wetlands and Riparian Areas
Harm to Wetlands High volume removal of surface or groundwater can result in damage to wetlands, which rely on ample water supplies to maintain the fragile dynamics of a wetland habitat. Damage can also occur from spills of chemicals or wastewater, filling operations, and sediment runoff. Many plant and animal species depend on wetland habitats, and even small changes can lead to significant impacts. Wetlands provide a variety of "eco-service" functions, including water purification, protection from floods, and functioning as carbon sinks. The ecological importance of wetlands is unquestionable, and their full protection is paramount. The EIS and Statewide Study must analyze these potential impacts to wetlands.
Inventories and maps of existing wetlands and waters of the US within the planning area, including wetlands that are regulated under Section 404 of the CWA and wetlands that are determined to be non-jurisdictional and protected under Executive Order 11990 - Protection of Wetlands (May 24, 1977), and, where applicable, acreages and channel lengths, habitat types, values, and functions of these waters.
Executive Order 11990 directs all federal Agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands regardless of the CWA § 404 jurisdictional status of the wetlands. Executive Order 11988 - Floodplain Management calls on Agencies to avoid, to the extent possible, impacts associated with the occupancy and modification of floodplains, and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Well pad construction in floodplains presents the potential for flood damage to well-heads and associated production equipment that could result in leaks or spills of toxic materials to waterbodies, and should be avoided.
In addition to the water quality and water quantity impacts discussed in the preceding sections, the EPA recommends that the BLM disclose the extent to which wetlands, riparian areas and floodplains could be impacted by potential activities, including with respect to: stream structure and channel stability; streambed substrate, including season and spawning habitats; stream bank vegetation, riparian habitats, and aquatic biota; and the cumulative effects of increased levels of erosion and sedimentation.
We also recommend that the DEIS analyze methods for restricting actions in these important resource areas and developing and enforcing BMPs to mitigate the potential impacts of the project. More specifically, the EPA suggests that the DEIS: - Include a development buffer to protect wetlands, riparian areas and floodplains. A buffer will help to prevent erosion and sedimentation impacts in sensitive soils, possible spills or leaks from reaching surface water resources, impacts to wetland plants in unique wetlands such as springs and seeps, which can be difficult to replace (e.g., compensatory mitigation through restoration or creation may not be feasible), or disturbance to surface or groundwater hydrology which could impact the viability of wetlands. - Identify specific mitigation requirements and BMPs applicable to the operator for all phases and actions involved in drilling and production to prevent direct and/or indirect impacts that may exist despite the No Surface Occupancy stipulation (e.g., water quality or hydrologic impacts). - As future development proceeds, the EPA encourages the BLM to require delineation and marking of perennial seeps, springs and wetlands on maps and on the ground before development so operators can avoid impacts to them.
Water Quality – General
For these concerns, as well as grave concerns around the health of our drinking water, as proven by a precedent case in in northeastern Pennsylvania and upstate NY (the Marcellus and Utica shale formations were found to have 17 higher levels of methane than in drinking wells that were not near drilling sites. See the article "Blind Rush?: Shale Gas Boom Proceeds amid Human Health Questions, published in Environmental Health Perspectives" by C.W. Schmidt in 2011 for citation, please take very seriously the plans to begin fracking.
Harm to Water Quality Water quality must be a focus of the EIS and Statewide Study. Across the US, in states where hydraulic fracturing or other types of unconventional oil and gas recovery has

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occurred, surface water and groundwater have been contaminated. Water contamination has been attributed to unconventional oil and gas activity in several states, including Wyoming, Texas, Pennsylvania, Colorado, and Ohio.

The DEIS should present baseline data on the condition and quality of groundwater and surface water resources and, where appropriate and possible, reasons why these resources have been impacted (e.g., oil and gas development, mining), including:

o Lists of any Clean Water Act impaired or threatened waterbody segments within, or downstream of, the project area, including the designated uses of the waterbodies and the specific pollutants of concern.

The DEIS should include a comprehensive analysis of potential impacts to the quality of surface water and groundwater resources and evaluate the following activities for their impacts:

o Waste management, including use, reuse, recycling and disposal of oil and gas produced and flowback water.

o Impacts to shallow aquifers from oil and gas well drilling, well completion and production.

o Management of spills or leaks from surface impoundments, oil and gas pits, or produced water evaporation ponds.

o Erosion and sedimentation impacts associated with surface disturbance, including those associated with roads, well pad construction, well drilling and completion, and pipelines.

- As part of completing the aforementioned evaluation, the following resource impacts should be discussed, including disclosure of which waters may be impacted, the nature of potential impacts, and specific pollutants likely to impact those waters:

o Groundwater: Potential impacts to groundwater, including municipal or private water supplies. We recommend that this include an analysis of the management of any fluids that will be injected underground for well completion, including the toxicity and fate of these fluids, with a focus on avoiding surface spills or leaks of these fluids.

o Impaired Waterbodies: Potential impacts to impaired waterbodies, including waterbodies listed on the CWA § 303(d) list and waterbodies with completed Total Maximum Daily Loads (TMDLs).

o Surface Water Quality and Sedimentation: Potential impacts to water quality from runoff associated with surface disturbance. Erodible soils can represent a significant nonpoint source, and runoff could introduce sediments, as well as salts, selenium and other heavy metals into surface waters. To ensure sufficient information is included about the potential impacts of soil disturbance, we recommend that the DEIS include an estimate of erosion rates for each alternative in tons per year based on amount of surface disturbance, soil types, topography and slope, to avoid significant sedimentation.

Drinking water wells studied near the Marcellus and Utica shale formations in northeastern Pennsylvania and upstate NY were found to have 17 higher levels of methane than in drinking wells that were not near drilling sites (Blind Rush?: Shale Gas Boom Proceeds amid Human Health Questions, published in Environmental Health Perspectives by C.W. Schmidt in 2011.

The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include

Air , Water, and Soil Contamination - Oil and gas development release a number pollutants that degrade the quality of our air, water, and soil.

The EIS should study all environmental impacts made more severe by fracking and other types of unconventional oil and gas extraction. These include:

o Air, Water, and Soil Contamination: Fracking uses hundreds of chemicals that are known to have adverse human health impacts. Numerous instances of contamination have been reported in places where fracking has occurred. The EIS must include an analysis of adverse human health impacts from all of the chemicals used in the fracking process, as

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well as from those chemicals used in other types of unconventional oil and gas extraction techniques.
BLM land should be closed, in particular to oil and gas development that involves hydraulic fracturing. There are too many unknowns about the impacts of hydraulic fracturing at this point for the BLM to properly analyze the impacts of fracking in the EIS. New studies have been released as recently as December 2013 (such as Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region Kassotis et al. 2013) on the negative impacts hydraulic fracturing has on public health and safety and on water and air quality.
Due to the negative impacts to surface water and groundwater, to air quality, and to human health through exposure to endocrine disruptors and other chemicals present in fracking fluids, it will be impossible for the BLM to reach these RMP objectives while using hydraulic fracturing as an oil and gas extraction method.
Disposal of produced and wastewater generated during drilling activities is a problem faced by all areas where O&G extraction occurs. Although some methods of recycling make produced water from drilling activities available for agricultural uses, there is no guarantee of its quality, and this water is classified as not safe for human or animal consumption. Reinjection activities may further degrade the quality of groundwater sources, and increase the possibility of seismic activity. Well- defined and concise plans for disposal of wastewater will help protect the quality of surface and groundwater, and prevent seismic activity.
In California, fracking threatens the soil and water quality that are essential to the state's wine, agricultural and fishing industries. While no government agency currently keeps track of fracking activities in California, BLM estimates that 90 percent of wells drilled on Indian and Federal lands are fracked. 77 Fed. Reg. 27,691, 27,693 (May 11, 2012). BLM currently leases over 36 million acres of land a land area equal in size to the state of Michigan - for potential oil and gas development in 24 states, and periodically offers more land for leasing. BLM is initiating a planning process to address oil and gas development on public lands and federal mineral estate in California, and may amend the Resource Management Plans ("RMPs") for some of BLM's California field offices. To help inform the planning process, BLM is also initiating a scientific assessment of the current state of practices for well completion and stimulation in California. This science assessment will be led by the California Council on Science and Technology, and will be peer-reviewed.
Concerned about: The high consequences of contamination or loss of drinking water and the perceived probability of one that protections are not adequate or are not reliable results In unacceptable Risk.
In the search for oil, gas and development of federal minerals in the Central Coast, Ohlone/Costanoan- Esselen Nation objects to disturbance using the hydraulic fracturing process. Fracturing can lead to environmental risks, contamination of ground water, depletion of fresh water, contamination of the air. There are increases in earthquake activity associated with the degradation of bedrock.
The current Citadel Project Indian, taking place on private land six to eight miles from the Pinnacles National Park is an example of a threat to the condors. This project involves thermal stimulation with high pressure steam at a depth of three to six hundred feet. This is very close to the surface and in an area known for earthquakes and faults. A blowout occuring during stimulation could discharge water contaminated with oil and chemicals to the surface and pose a risk to animals and to the condors themselves.
It has been clearly demonstrated in states like Pennsylvania that fracking cannot be done without harming aquifers, people, or our climate.
Consider the impacts of seismic activity induced by wastewater injection would have on socioeconomics, public health and safety, and water quality.
Water Quality – Ground
Accidental spills are also an inevitable occurrence and the risk of harms from such spills must be incorporated into the EIS and Statewide Study. Improper well construction and loss of mechanical integrity are recognized as one of the highest risks of groundwater contamination and constitute another event through which chemicals can threaten public health and safety. (See Section II.G.2 for further discussion.)

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Groundwater Contamination

There have been many instances of groundwater contamination in other parts of the country where hydraulic fracturing has occurred. Hydraulic fracturing and other unconventional techniques pose an inherent risk to groundwater that must be properly evaluated in the EIS and Statewide Study. Once groundwater is contaminated, it is very difficult, if not impossible, to restore the original quality of the water.

Groundwater contamination can occur in a number of ways. Poorly constructed or abandoned wells are recognized as one of the most likely ways by which contaminants may reach groundwater. Improper well construction is cited as a confirmed or potential cause of groundwater contamination in numerous incidents at locations across the US including but not limited to Pennsylvania, Colorado, Ohio, and Wyoming.

Mechanical integrity, which refers to an absence of leakage pathways through the casing and cement, can degrade over time, eventually leading to mechanical integrity failures that may impact groundwater. A well in which stimulation operations are being conducted may also "communicate" with nearby wells, which may lead to groundwater contamination, particularly if the nearby wells are improperly constructed or abandoned.

Current state and federal rules do not ensure well integrity. The well casing can potentially fail over time and potentially create pathways for contaminants to reach groundwater. Well casing failure can occur due to improper or negligent construction. BLM should study the rates of well casing failures over time and evaluate the likelihood that well casing failures can lead to groundwater contamination.

Chemicals and naturally occurring substances can also migrate to groundwater through newly created fractures underground. Many unconventional techniques intentionally fracture the formation to increase the flow of gas or oil. These new cracks and fissures can allow the additives or naturally occurring elements such as natural gas to migrate to groundwater. Fluids can also migrate through pre-existing and natural faults and fractures that may become pathways once the hydraulic fracturing or other method has been used.

The migration may occur over a number of years. Thus, the EIS and Statewide Study must include long-term studies on the frequency and effect of fluid migration through newly created subsurface pathways. Fluid migration is of particular concern when oil and gas operations are close to drinking water supplies. Unfiltered drinking water supplies especially at risk because they have no readily available means of removing contaminants from the water. Even water supplies with filtration systems are not designed to handle the kind of contaminants that result from unconventional oil and gas extraction.

The DEIS should discuss groundwater resources, with particular emphasis on:

o The major aquifers in the basin, their three dimensional extent, the physical and chemical characteristics of their groundwater, estimates of the quantity of water in the aquifers and aquifer recharge rates.

o The location and extent of the groundwater recharge areas.

o The location of shallow and sensitive aquifers that are susceptible to contamination from surface activities.

o The location of existing and potential underground sources of drinking water. Underground sources of drinking water include not only those formations that are presently being used for drinking water, but also those that can reasonably be used in the future.

The EPA recommends that the DEIS identify and discuss how surface water and groundwater quality would be protected during future oil and gas development and how significant impacts would be mitigated. This can be accomplished by developing specific stipulations for avoiding wells and surface disturbing activities in sensitive resources areas. Once the impact analysis is complete, EPA would like to work with BLM in on the identification of appropriate strategies to mitigate significant impacts.

In the absence of groundwater modeling to determine the distance from the project at which impacts may occur, the EPA recommends that the BLM adopt a requirement for monitoring to occur in private wells within one mile of an oil and/or gas project area. This monitoring will help assure mitigation measures are adequate and that water

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resources are being fully protected.
BLM land in all California Field Offices should be closed to further oil and gas development and future oil and gas leasing, especially in regard to hydraulic fracturing. Lots of research to support this, but the biggest is we are in a drought and fracking costs millions of gallons of water that is unusable. That polluted water is sent back beneath the water table but it is possible for it to leach into local water supplies.
Studies such as the Endrocrine Society's 2013 study by Christopher D. Kassotis et al, entitled Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region, have concluded that the fracturing fluid used in hydraulic fracturing contains end ocrine disrupting chemicals, which are linked to increased instances of cancer, birth defects, decreased sperm quality and quantity, infertility and reproductive tract deformities. After hydraulic fracturing is completed, only 60 to 80 percent of the fracturing fluid is reclaimed. This means that the remaining 40 to 20 percent of the fluid remains underground has the potential to contaminate groundwater over time. Even though fracturing fluid is primarily made up of water, and chemicals constitute only a very small percentage, the chemicals are potent enough to have negative impacts even in low concentrations. Endocrine disrupters in particular are known for having impacts at very low levels, and they have the potential for exacerbated effects when mixed with other chemicals.
Drinking water wells studied near the Marcellus and Utica shale formations in northeastern Pennsylvania and upstate NY were found to have 17 times higher levels of methane than in drinking wells that were not near drilling sites (from the article Blind Rush?: Shale Gas Boom Proceeds amid Human Health Questions, published in Environmental Health Perspectives by C.W. Schmidt in 2011).
Injection wells are typically used for long---term and essentially permanent storage of waste fluid and "produced water. Thus the long term integrity and effect of these injection wells must be evaluated as part of the EIS and Statewide Study. Injecting and storing polluted wastewater underground in these injection wells has been shown to cause a variety of risks. The potential for the permanent pollution of ground water basins is a major question that must be addressed in the EIS. The long-term integrity of cement well seals that are commonly claimed to protect ground water from being polluted by the migration of injection fluids is an open question. There is extensive evidence from many locations that well seals commonly fail over time and allow deep storage injection fluids to migrate up the well bore and casing and pollute and ruin ground water supplies.
During high-pressure fracking, extreme fluid pressures are applied to well bores (including horizontal bores. These pressures can split well bore casings, well pipes, and potentially crack the well seals that are intended to isolate different geological strata. The potential for the failure of well seals and zonal isolation from ground water must be addressed.
Hydrology and Water Quality. The increased use of scare groundwater resources and the potential contamination of drinking water and irrigation water resources by chemicals used in well stimulations treatments for the unconventional development of oil and gas are of paramount concern. The EIS should analyze the range of potential impacts to water sources and water quality from both conventional and unconventional oil and gas development. To do this, the EIS should identify water resources within the geographic region that may be used or developed for conventional and unconventional oil and gas production and analyze the potential that these sources will be contaminated by well stimulation activity. This analysis should also take into account the disposal of wastewater, including the recycling or reuse of wastewater, resulting from well stimulation treatments and related oil and gas development activities. Finally, the amount of water used in well stimulation treatments for unconventional development of oil and gas needs to be estimated and the EIS must analyze the impact this use will have on further constraining the available water supply for both human uses and biological resources. Specific recommendations include:
The chemicals used in well stimulation activities and likely to be encountered in flowback and produced fluids should be identified and their impacts on drinking water and agricultural water should be analyzed.
Furthermore, the permanent risks to Central California's aquifer and wells from fracking fluid contamination are too permanent and too great to consciously permit fracking. Oil exploration cannot come at the detriment of agriculture, ranching, and tourism, which are the fundamentals of San Benito economy.
Oil and gas development on federal lands within the condor's range poses a significant risk to the continued recovery of the California Condor. This risk stems from possible contamination of surface water supplies, including springs, creeks and livestock water troughs, created by leaks and blowouts associated with oil and gas development. Condors

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not only drink from these surface water sources but are also at risk of consuming contaminated carrion.
Along with water depletion, we risk contamination to existing water supplies. Hundreds of thousands of gallons of water per well are pumped out of the ground for fracking, and then returned as toxic waste to wells of documented uncertain integrity. Should ground water become contaminated through well casing failure the damage can reach far beyond BLM boundaries.
You should abide by the precautionary principle and protect our ground waters from the imminent risk of contamination by the toxic brew involved in fracking.
The water under BLM land does not stay there. BLM ground water flows under my land. If BLM pollutes their ground water and I end up with polluted water are you going to buy my land? My only water source is a deep well. This is a giant class action suite waiting to happen. Do NOT allow fracking on BLM land.
Water Quality – Surface
Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.
Withdrawal of large quantities of freshwater from streams and other surface waters will undoubtedly have an impact on the environment. Withdrawing water from streams will decrease the supply for downstream users, such as farmers or municipalities. Reductions in stream flows may also lead to downstream water quality problems by diminishing the water bodies' capacity for dilution and degradation of pollutants. The EIS and Statewide Study must examine these issues.
Rapid runoff, even without contaminants, can harm the environment by changing water flow patterns and causing erosion, habitat loss, and flooding. Greater runoff volumes may also increase the amount of sediment that is carried to lakes and streams, affecting the turbidity and chemical content of surface waters. Oil and gas operations require land clearance for access roads, well pads, drilling equipment, chemical storage, and waste disposal pits. Not only do these activities create pollution, they create greater conduits for storm water runoff to carry those pollutants far from the operation site.
Surface water contamination Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, described above, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners. As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities. The EIS and Statewide Study should fully assess the risk of harm to surface waters as well as the feasibility of restoring the original water quality once surface water is contaminated.
Accidental spills or intentional dumping of wastewater can contaminate surface water and cause large-scale harm to wildlife. Numerous incidents of wastewater contamination from pipelines, equipment blowouts, and trucks accidents have been reported, and have resulted in kills of fish, aquatic invertebrates, and trees and shrubs, as well as negative health effects for wildlife and domestic animals. For example, a company recently admitted to dumping wastewater from hydraulic fracturing operations into the Acorn Fork Creek in Kentucky, causing a massive fish kill. Among the species harmed was the blackside dace, a threatened minnow species. The discharge of fracking wastewater into the Susquehanna River in Pennsylvania is suspected to be the cause of fish abnormalities, including high rates of spots, lesions, and intersex. In West Virginia, the permitted application of hydrofracturing fluid to an area of mixed hardwood forest caused extensive tree mortality and a 50-fold increase in surface soil concentrations of sodium and chloride.
The EPA recommends that the DEIS identify and discuss how surface water and groundwater quality would be protected during future oil and gas development and how significant impacts would be mitigated. This can be accomplished by developing specific stipulations for avoiding wells and surface disturbing activities in sensitive resources areas. Once the impact analysis is complete, EPA would like to work with BLM in on the identification of appropriate strategies to mitigate significant impacts.

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Water Supply – General
Some unconventional extraction techniques, most notably hydraulic fracturing, require the use of tremendous amounts of freshwater. The increased use of freshwater in California, a state struggling to provide enough freshwater to its various constituencies, would be greatly affected by the increased demand for water if hydraulic fracturing and other unconventional oil and gas extraction is permitted on public lands. In other states where hydraulic fracturing has occurred, operators reported using millions of gallons of freshwater per well that has used hydraulic fracturing. Although some have claimed water use in California will be less than other states, some operators have reported similar levels of water use. Water used in large quantities may lead to several kinds of harmful environmental impacts. The EIS and Statewide Study must analyze where water will be sourced, how much, and the effects on water sources under different alternatives.
Aquifer Depletion Withdrawing large quantities of water from subsurface waters to supply oil and gas production will likely deplete and harm aquifers. Removing water from surface water or directly from underground sources of water faster than the rate that aquifers can be replenished will lower the volume of water available for other uses. Depletion can also lead to aquifer compaction, after which the original level of water volume can never be restored. The EIS and Statewide Study must consider the potential aquifer depletion and impacts.
Water depletion can also affect species whose habitats are far removed from the actual well site. Because of the high volume of water required for even a single well that uses unconventional extraction methods, the cumulative water depletion could have a significant impact on species that rely on water sources that serve to supply oil and gas operations. There may also be changes to water temperature and chemistry. Habitat can be altered in other ways that negatively impact wildlife. For example, ground nesting birds such as grouse will avoid tall structures.
The BLM should conduct a full assessment of the direct and indirect impacts of oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.
Further, because availability of freshwater could be a concern for future oil and gas development projects in the planning area, we recommend that the DEIS confirm that future projects will need a water resource management plan to address water consumption and produced water disposal, including identifying water recycling opportunities.
BLM land in all California Field Offices should be closed to further oil and gas development and future oil and gas leasing, especially in regard to hydraulic fracturing. Lots of research to support this, but the biggest is we are in a drought and fracking costs millions of gallons of water that is unusable. That polluted water is sent back beneath the water table but it is possible for it to leach into local water supplies.
Water Resource Depletion- Fracking can use up to 1 million gallons of freshwater per fracking event, and each well can be fracked multiple times over the life of the well. Especially given that California is in a declared state emergency drought, the impact of water resource depletion through fracking must be fully understood and analyzed.
Fracking will consume millions of gallons of freshwater, at a time when state water reserves are far below desired levels. Combined with the chemicals, the once fresh water is now poisonous fracking fluid. This contaminated wastewater must be discharged from the wells, transported and stored. Each of these steps is a chance for contamination of the local groundwater, soil and air. California is in a declared drought emergency. The impact of water resource depletion through fracking must be fully understood and analyzed.
Concerned about: The high consequences of contamination or loss of drinking water and the perceived probability of one that protections are not adequate or are not reliable results in

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unacceptable Risk.
Hydraulic fracturing, especially when used to stimulate oil and gas production from a shale resource, customarily requires large quantities of water. In arid landscapes such as California, the use of surface or groundwater supplies should be minimized and mitigated so that there is no net consumptive use of water. Where water use for hydraulic fracturing would threaten ecologically important resources, leasing should be precluded.
Heather Cooley, co-director of Pacific Institutes water program, talks about its scarcity in California. Adding hydraulic fracturing to extract oil and gas will affect our limited supply- fracking uses massive quantities that can pose conflicts with other needs including agriculture and wildlife habitats. Methane has contaminated drinking wells. Devastating incidents with storage, transport, and waste water have plagued communities.
Lifting the current ban on fracking on BLM land is a game of long and short-term risk. Risk to depleteing water in some of the more arid environments in the state; example- San Benito County where I live. California places nature, people and agriculture at odds over water. The state supplies almost 50% of the nation's fresh food. 10 year estimates increase our state population to 50 million people. The current drought threatens Coho salmon with extinction. Can we really afford to add powerful corporate oil interests to the tug of war on water?
Due to the potential serious environmental, human health and safety, and socioeconomic impacts that hydraulic fracturing has already been shown to be capable of, I request the following of the BLM during the EIS process: The cumulative impacts on water supply contamination must be analyzed.
CONSIDER THE SERIOUS THREAT TO OUR WATER SUPPLY.
We need clean water in this state. Fracking is very water intensive.
In the search for oil, gas and development of federal minerals in the Central Coast, Ohlone/Costanoan- Esselen Nation objects to disturbance using the hydraulic fracturing process. Fracturing can lead to environmental risks, contamination of ground water, depletion of fresh water, contamination of the air. There are increases in earthquake activity associated with the degradation of bedrock.
Fracking is dangerous to all concerned, workers, people and other life living in the area, the environment. It should be ditched and investments made to make sustainable wind, solar and other green energy sources workable for the power grid. In California, there are 3 top reasons to continue the moratorium- damage to agriculture & water supplies and earthquakes. There is even concern that it can cause earthquakes or tremors. This is of special concern of course in California especially with Diablo Canyon nuclear power plant located on a fault zone which ties into larger systems. Fracking is a heavily polluting invasive extraction system which also has the potential to harm water supplies in a state that has water shortages. No only that, California is one of the richest agricultural zones on the planet.
We cannot afford the huge volume of water wasted in this process.
I believe fracking poses a danger to us on many levels including excessive water use
Water is scarce in CA already! Why do we want toxic chemicals pumped into our water tables? Put an end to fracking now!
Fracking could potentially cause devastating earthquakes and would certainly require copious amounts of water. The risks and water consumption outweigh the possible benefits of fracking
Water Supply – Ground
The DEIS should discuss groundwater resources, with particular emphasis on: o The major aquifers in the basin, their three dimensional extent, the physical and chemical characteristics of their groundwater, estimates of the quantity of water in the

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aquifers and aquifer recharge rates. o The location and extent of the groundwater recharge areas. o The location of shallow and sensitive aquifers that are susceptible to contamination from surface activities. o The location of existing and potential underground sources of drinking water. Underground sources of drinking water include not only those formations that are presently being used for drinking water, but also those that can reasonably be used in the future.
Increased traffic on underdeveloped and rural roads, along with increased construction and operation activities, will have a detrimental impact on air quality and other resources. A complete cumulative impacts study is necessary in order to fully analyze the results of increased O&G development in these areas, such as decreased land use for agriculture, cattle grazing, and recharge areas for groundwater.
A thorough study of the risks associated with leaks from well casings will help create a comprehensive mitigation plan in case of failure, and prevent contamination of groundwater supplies.
Hydrology and Water Quality. The increased use of scare groundwater resources and the potential contamination of drinking water and irrigation water resources by chemicals used in well stimulations treatments for the unconventional development of oil and gas are of paramount concern. The EIS should analyze the range of potential impacts to water sources and water quality from both conventional and unconventional oil and gas development. To do this, the EIS should identify water resources within the geographic region that may be used or developed for conventional and unconventional oil and gas production and analyze the potential that these sources will be contaminated by well stimulation activity. This analysis should also take into account the disposal of wastewater, including the recycling or reuse of wastewater, resulting from well stimulation treatments and related oil and gas development activities. Finally, the amount of water used in well stimulation treatments for unconventional development of oil and gas needs to be estimated and the EIS must analyze the impact this use will have on further constraining the available water supply for both human uses and biological resources. Specific recommendations include:
Groundwater aquifers and existing (and new) groundwater wells should be identified and mapped, along with an indication of whether the aquifer supports important biological resources or is used for a particular human use (e.g., agriculture, residential drinking water).
The EIS should analyze the effects of using ranges of water quantities in well stimulation activities for conventional and unconventional oil and gas development. The EIS should also analyze the impacts on groundwater- dependent and freshwater systems if groundwater is pumped to supply the well stimulation activities, across the broader area where conventional and unconventional oil and gas development could occur.
In many states, including California, the regulation of groundwater pumping is inadequate to prevent harm to important ecological resources. Despite the predominant role of state regulation of groundwater, the BLM has an independent duty, found in its organic act and other authorities, to protect the ecological resources of federal lands. That duty includes maintaining sufficient water to support natural communities that depend on it. BLM's scientific and environmental study should include an assessment of the effects of the use of significant quantities of water in conventional and unconventional hydrocarbon production.
Due to the potential serious environmental, human health and safety, and socioeconomic impacts that hydraulic fracturing has already been shown to be capable of, I request the following of the BLM during the EIS process: The EIS must consider the nexus of groundwater contamination to the surface uses that are within BLM management range (i.e. vernal pools, riparian areas)
Fracking has a very negative effect on the water tables - in California these water tables supply much of the water needed for our food and also to drink. Don't destroy the "bread basket" of the world by allowing fracking on public land.
We don't know yet what the impacts to our underground aquifers are, or the effect on earthquake faults.

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Water Supply – Surface
Withdrawal of large quantities of freshwater from streams and other surface waters will undoubtedly have an impact on the environment. Withdrawing water from streams will decrease the supply for downstream users, such as farmers or municipalities. Reductions in stream flows may also lead to downstream water quality problems by diminishing the water bodies' capacity for dilution and degradation of pollutants. The EIS and Statewide Study must examine these issues.
Harm to Aquatic Life and Habitats When streams and other surface waters are depleted, the habitat for countless plans and animals will be harmed and place tremendous pressure on species that depend on having a constant and ample stream of water. Physical habitats such as banks, pools, runs, and glides (low gradient river sections) are important yet susceptible to disturbance with changing stream flows. Altering the volume of water can also change the water's temperature and oxygen content, harming some species that require a certain level of oxygenated water. Decreasing the volume of streamflow and stream channels by diverting water to hydraulic fracturing would have a negative impact on the environment and should be included in an EIS and Statewide Study.
Surface water resources (lakes, rivers, streams, springs, wetlands, etc.) should be identified and mapped.
Water Resources
On May 31, 2013, the US District Court for the Northern District of California ruled in Center for Biological Diversity v. Bureau of Land Management that BLM violated the National Environmental Policy Act3 ("NEPA") in issuing oil and gas leases without first analyzing the full extent of extreme extraction techniques such as hydraulic fracturing. Where such activity has occurred in other states, the environmental impact has been considerable. Water, air, soil, wildlife, and the climate have all been harmed by the expansion of unconventional extraction methods.
Storm Water Runoff The EIS and Statewide Study should examine the effect that oil and gas development would have with increasing storm water runoff. Water from precipitation and snowmelt can serve as an avenue through which contaminants travel from an operation site to sensitive areas. While undisturbed land can retain greater amounts of water through plants and pervious soil, land that has been disturbed or developed may be unable to retain as much water, thereby increasing the volume of runoff. The area of land that is able to retain water will be significantly decreased if unconventional oil and gas extraction methods are permitted to expand.
Conversely, continuing to allow oil and gas extraction, including unconventional methods, would run counter to many if not all of the stated objectives in the current Hollister RMP. For example, it is impossible to "protect public health and safety and environmental resources by minimizing environmental contamination from past and present land uses..on public lands" while allowing extreme oil and gas extraction to endanger public health and safety and the environment. Similarly, it is difficult to reconcile the Hollister RMP's goal to "maintain, restore, or improve water quality and quantity to sustain the designated beneficial uses on BLM lands" without consideration of a complete ban on oil and gas extraction techniques that pose grave threats to water quality and supply.
The water used in drilling and hydraulic fracturing can come from a variety of sources. It may be: purchased or leased from municipal supplies; transferred as water rights, such as agriculture water rights; fully consumable water (leased or purchased effluent); or produced water (non-tributary). The amount of water used in oil and gas operations depends largely upon the type of well being drilled.
We recommend that the BLM map groundwater and surface water resources in the development area. This should include: o A summary discussion of the water resources that exist in the planning area (i.e., miles of streams, acreage of lakes, acreage of riparian areas, number of springs, etc.). o Identification of surface and groundwater uses within the planning area, including: all source water protection areas within each alternative (i.e., Sole Source Aquifers, Drinking Water Source Protection Zones, or Municipal Watersheds), and the location and source identification of agricultural, domestic and public water supply wells, springs, or surface water intakes.

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The technique of hydraulic fracturing and completion of each well may require the consumption of 2 to 4 million gallons of water.7 Though recycling is being used in some oil and gas fields, most of the water used is consumed. The fracturing fluids used consist mostly of freshwater amended with chemical additives. Between 25 and 100 percent of the fracturing fluid may be returned to the surface as "flowback" and eventually transitions to "produced" water, which must then be treated or disposed. In addition to chemical additives, the flowback water from hydraulic fracturing typically contains high levels of total dissolved solids, hydrocarbons, heavy metals and radionuclides and must be properly managed. This flow back water is either treated or disposed of in deep injection wells.
The DEIS should disclose, to the extent that information is available, the water needs and anticipated sources for projected oil and gas development in the planning area. The EPA recommends reuse of produced water for these activities to reduce the use of drinking water resources and help ensure the long term sustainability of these operations.
In order to protect surface water and groundwater resources, the DEIS should include a requirement for fracture monitoring. Fracture monitoring can be accomplished with Tiltmeter Monitoring and/or Microseismic Monitoring. The purpose of these monitoring techniques is primarily to locate the vertical extent of the newly created fractures and verify that the vertical extent of fracturing does not reach any aquifers.
The DEIS should include a commitment that future project-level NEPA analyses for oil and gas development will contain a monitoring plan and program to track groundwater and surface water impacts as drilling and production operations occur. The purpose would be to ensure that the BMPs are mitigating impacts from routine development activity, and to identify potential impacts associated with spills or leaks of hazardous materials. An essential component of future project-level monitoring would be baseline and long-term monitoring for private wells.
I believe that hydraulic fracking at any time, especially this time, in a time of drought, is idiotic and dangerous. Why would we waste already so precious, clean water in GREAT amounts to poison it and put it back in the ground where it has potential to contaminate remaining clean ground water.
Water Resources Agency
The Monterey County Water Resources Agency (MCRWA) has previously expressed concern regarding the impact of potential lease areas to MCRWA water supply facilities. The Rinconada Fault lies directly under the San Antonio Dam and has been identified as a likely earthquake source. The MCRWA does not recommend approval of hydraulic fracturing operations within close proximity to Nacimiento and San Antonio Dams and Reservoirs due to the presence of nearby faults and the potential of hydraulic fracturing operations to impact water quality and quantity in the local area. The following must be analyzed in the EIS: - Analysis of the potential impacts of hydraulic fracturing to water quality and quantity both locally and regionally. - Analysis of the potential for increased seismic activity due to hydraulic fracturing and the potential impacts, including impacts to County operated lakes, dams and reservoirs.
The County of Monterey also has great concern regarding the water supply impacts of hydraulic fracturing and other well stimulation techniques. Where will the water come from? Does the water used in these techniques conflict with agricultural or domestic water supplies? Is it obtained from surface waters or groundwater, and what is the impact on the aquifer?
Because of the large amounts of water necessary for alternative and unconventional well stimulation techniques, the possibility exists that surface and groundwater supplies will be depleted, creating a deficit in recharge areas and lowering the local water table. Clear plans for mitigating water quality and quantity issues are necessary to prevent negative environmental and public health impacts.
Pinnacles National Park
The federally endangered California condor has been reintroduced at Pinnacles National Park and along the Big Sur coast. This central California flock of 60 wild condors regularly utilizes public lands managed by the BLM Hollister Field Office. NPS is concerned about potential impacts to the California condor from proposed oil and gas development within the central California flock's range, and also has concerns about potential impacts to water quality and quantity of local aquifers.

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NPS is also concerned about potential impacts to this area's scarce water resources both of water quality and quantity due to the disposal of oil development waste products and requirements for large quantities of water.
(5) California's complex geology includes many unknown deep faults, geologic slip planes and other geologic formation elements that could allow chemical fracking fluids, oil and gas to escape upward into the five hundred foot deep level that is generally considered to the lower depth of most ground water basins. Fracking may occur as much as one to two miles below the earth surface, but rock faults can exist or be opened and thus allow deep salt and fracking chemical polluted water to merge with ground water over time. A geo analysis of the lands intended for possible leasing has to occur before any lease of public lands is considered. The EIS must include the geologic study sufficient to address this risk.
(7) The sheer volume of water that may be used for new unconventional oil and gas production needs to be assessed and estimated. The water supplies in the California counties spanning the jurisdiction of the Hollister office are virtually all over---subscribed and under stress. In many instances the hydraulic fracturing of oil and gas wells uses huge volumes of water. Water used in a Monterey Shale oil play will be in competition with agriculture, wildlife, municipal, and rural homestead uses. This completion for water supplies may prove to be intense. The EIS must assess the impacts of the additional demand for water resources that these new unconventional oil production sites will create. Few people in California want to replace agriculture with oil production. This is a major issue to be addressed in the EIS.
Concerned about: Clean drinking water (potential contamination and subsequent loss)
Concerned about: Aquifer contamination affecting human and agriculture use. (potential contamination and subsequent loss)
Concerned about: Integrity and reliability of drill casing and impact of any failures.
The EIS should analyze potential wastewater disposal impacts on water and land resources and seismicity for unconventional oil and gas development.
The EIS should analyze impacts to freshwater systems from sedimentation due to land disturbance activities from both conventional and unconventional oil and gas development.
Water is a precious resource in the Western part of the United States. Many competing interests vie for it in our state - Northern California vs Southern California, agriculture vs rivers and fish, households vs golf courses, and so on. At the same time, well stimulation techniques require vast amounts of water. There is no doubt that the oil and gas industry has the wherewithal to purchase the water it needs. But at whose expense? At what cost to the environment? These are questions the EIS must address.
When it comes to water, well stimulation is a double whammy: On the front end, water is consumed and turned into toxic waste. On the back end, when the oil and gas is burned, it will add more carbon to the atmosphere and contribute to global warming. Among other things, that will further intensify extreme weather events, like our current drought, restricting our supply of water still more.
Fracking and other types of unconventional oil and gas extraction also employ vast amounts of freshwater which cannot be reused for other purposes. California is currently experiencing a historic daught. It is unreasonable and dangerous to further stress our water resources by permanently removing precious gallons from our supply.
And I don't want hydrofluoric acid anywhere near our precious water supplies. Looking at recent events in Virginia, I don't trust industry with our water. We need to preserve our aquifers, especially as it appears that drought is becoming more common.

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It might be reasonable to expect our basic laws to protect our water supplies, but both the Clean Water Act and the Safe Drinking Water Act contain exclusions for oil and gas production. It's the Halliburton Loophole. So it's really up to us, it's up to you, to protect our water supply.
Water has become extremely limited resource with multiple life defining agencies, household, and farming to industries competing for water. Use of water in large quantity is unacceptable. Hence fracking must be discouraged and banned.
Seismological and hydrological impact assessments are critical in consideration of any land use consideration of hydrological fracturing/acid fracturing/steam fracturing techniques in oil and gas exploration. Central California does not have the water supply to support fracking without causing a severe challenge to agricultural, ranching, and residential water usage.
Peter Gleick, Ph.D, a water and climate expert, spoke with "Los Angeles Magazine" about being up against peak limits on how much humans can consume. One example is the over pumping of groundwater and levels falling in many places throughout California. He says as we recognize the basic needs and human rights to water we should also guarantee that for the ecosystems. Our institutions must find better ways to protect the rural areas and open space as a guarantee in the future of availability and sustainability. We must proceed with new programs of planning and managing water systems, instead of business as usual, especially with this rapid climate change.
The EIS must justify the water use required in hydraulic fracturing and analyze how the use of water for oil and gas development will result in socioeconomic impacts, including socioeconomic impacts to individuals involved in the agricultural industry
In analyzing impacts of oil and gas development on water quality, soil and water contamination, public health and safety, hazardous materials, and socioeconomics, discuss the results of the paper, Fluid Migration Mechanisms due to Faulty Well Design and/or Construction: An Overview and Recent Experiences in the Pennsylvania Marcellus Play, by Anthony R. Ingraffea, that reported the increasing rate of well failure in the Marcellus Play between 2010-2012, with a well failure rate in 2012 of 7.2%.
Clean Safe Water is the most precious resource we have and any Fracking is a direct threat to that. We have barely enough clean water for our state and any loss will have huge health and economic consequences. Please Don't Frack my state.
There should be a state-wide moratorium on all fracking until we know all the ingredients used in the fracking process and what it's doing to our watertable. At the very least, it should be banned from public lands.
California already faces a water crisis and we can't risk this vital resource to the unknown dangers of fracking.
As a member of the public who has studied geophysics, I am deeply concerned about the practice of fracking for the removal of natural gas. When I first learned of the practice I predicted earthquakes, groundwater pollution, ground subsidence, and eventual travel of the pollutants to the surface 'downstream' through aquifers, faults, and natural fissures in the bedrock. We haven't seen all these yet, but there is strong evidence of the first two in the other states. Please, do not lift the fracking moratorium in California until the environmental studies are complete, and then only if they indicate the practice has no long-term damaging effects for the environment.
California is already short of potable water. As Texas has demonstrated so ably, fracking makes that worse.
As I understand it, once there are unwanted chemicals in the aquifers it is difficult and expensive to get them out. We know that one of our most precious resources now, and it will be increasingly more precious, is fresh water. Do not allow any practices which endanger our fresh water.
Some may be unaware that California is shot through with earthquake faults- fracking fluids will definitely contaminate aquifers. We need water much more than we need the drops of oil and gas achieved by fracking.
THERE IS MORE THAN ABUNDANT PROOF THAT FRACKING DESTROYS WATER SUPPLIES. DON'T MAKE CALIFORNIA DEPENDENT ON FOREIGN BOTTLED WATER (LIKE FROM, SAY, TEXAS) BECAUSE WE HAVE COMPLETELY DESTROYED OUR OWN.

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California doesn't have the water to spare for an industry that prolongs our dependence on fossil fuels. Moreover, the very real likelihood that drinking water will be contaminated with pollutants, not to mention the increased risk of earthquakes that pumping vast amounts of water underground entails, makes this a no-win situation.
Here in the Central Coast, we have massive water shortages affecting both the Cambria area but inland in the Paso Robles basin. We know of massive damage to the natural resources in numerous other states. We should not be fracking in Calirornia at all.
There are new studies just released by Duke University that show that radioactive levels are now more prevalent in water in Penn. shale fracking area and dangerous levels of methane and ethane in drinking water. Why would we allow this to continue on public lands in California while preparing an Environmental Impact Statement and independent analysis of fracking in California
Fracking uses (wastes) millions of gallons of water and fracking causes earthquakes where earthquakes are rare if ever. California is the last place to allow a planet destroying business for the sake of a job.
The fracturing of shale with toxic chemicals threatens our water supplies.They must be required to disclose those chemicals! They WILL invariably leach into our waterways.
Include, in the DEIS, a list of BMPs that may be required to protect surface water and groundwater resources, and the circumstances under which the BMPs would be applied (e.g., proximity to surface water resources, presence of erosive soils, slope, shallow water aquifers, proximity of water wells, etc.).
Explain, in the DEIS, how the BLM would ensure that the BMPs would be monitored and enforced.
Stand strong and protect our water, land and air from fracking. Remember, 6 MILLION gallons of water PER WELL!
I am so disappointed to learn that so much fracking has already been done in our beautiful state- which is currently lacking in clean water (which is wasted in huge amounts in the fracking process!!!!). So, please at least put a moratorium on the process until or unless it can be proven that it is safe and harmless.
Water is a precious commodity in CA and to risk polluting our aquifers, not to mention massive amounts of water required for fracking is irresponsible!
Trading fresh- or even reclaimable - water for fossil energy is a bad deal and good for nobody but the fossil firms and the people they pay off.
Fracking is already damaging ground water, and is seriously degrading the areas where it is practiced. We don't need the oil from fracking, not at the expense of our water sources. Water is already at a premium. It will be more so, going forward. Water is more important than oil. This is basic common sense. Please apply it to this situation and extend the moratorium.
If fracking is to be allowed in California, then require the industry to hold iron-clad insurance that will (more than) compensate communities in the event that their water supplies are compromised.
we know fracking water has high concentrations of RADIUM.
California already has water quantity and quality problems enough.
Before they were pulled, the scientific studies by the EPA were indicating that fracking was dangerous and had longterm effects on both land, water and the air quality.
I live in the Inland Empire (Riverside County) and we're underlain by part of the Monterey Shale. In addition, we get 100% of our water from wells (not Northern CA or the Colorado River). If the wells become polluted, my wife and I will be up a famous creek without a canoe (much less a paddle). Please do not put the cart before the horse here. Finish the studies and then make a policy determination.
I am concerned about the amount of water needed for fracking - it well known that California does not have enough water for its needs as it is. I am also concerned about the pollution of our ground water from fracking. There are already several towns in this state where the drinking water has become unsafe due to agricultural pollution or

hazardous waste disposal.
I would like to urge the BLM to continue the moratorium on fracking on California's public lands until more is known about it's consequences to the environment, specifically the public water supply that may be put at risk by the secret proprietary chemicals that the oil companies pump into the ground to break up the rocks to extract oil and natural gas. The oil companies won't make public exactly what's being used in the fracking process. My children drink water that may eventually contain these chemicals, if fracking is allowed to occur. If we, as citizens of California, are not allowed to know exactly what is being pumped into th eground so they can pump out oil and gas, then I don't think the oil companies should be allowed to go ahead with their fracking. We can't make informed decisions about the pros and cons without all the information. Keep the moratorium in place until we actually have all the facts. It's critical to the future of California's drinking water and the health of all of us
The side effects of fracking are not yet known- or maybe known to the companies doing the work, but they are certainly not volunteering the information. Damage to underground water supplies, poisoning farmland and wildlife, and long-term human health impacts have all been reported. Please do not allow these little understood risks to be forced upon Californians without more studies and safeguards. Once risks are identified, the companies doing the fracking should be obliged to pay for all remedies, such as increased health care costs, restoration of water supplies, etc.
Knowing that hydraulic fracture releases poisonous material into the air and water supply; destroys bedrock formations necessary to the stability of cities; and extracts negligible amounts of fuel in exchange for centuries' worth of pollution; we ask a prohibition thereof until superior fuels are in nationwide use, by all classes of society.
Because fracking is still a new method of extracting natural gas and because there has been widespread concern primarily about its potential to contaminate groundwater, lakes, and streams, the safer course for the BLM and the entire state of California would be to have a moratorium on fracking for two reasons. First, the risks of fracking will become more evident as the experiences of other states that have fracked for years, like Pennsylvania and Ohio, gives it an environmental track record. The second reason is that, with experience, states and gas companies will become better at avoiding adverse environmental consequences of fracking and dealing with them when they occur, as they have and will in the future.

Table C-7
Issue No. 2: Health and Safety

Hazardous Materials
Firstly, according to various studies, the fracturing fluid used in hydraulic fracturing contains endocrine disrupting chemicals, which are linked to increased instances of cancer, birth defects, decreased sperm quality and quantity, infertility and reproductive tract deformities. One example that sites these health side effects is the 2013 article published by the Endocrine Society, titled Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Groundwater in a Drilling-Dense Region, by Christopher D. Kassotis et al. Even though fracturing fluid is primarily made of water, and chemicals constitute only a very small percentage, the chemicals are able to have negative impacts even in low concentrations. This means that even if only trace amounts are detected, the harm to us and our children is simply not worth the risk. Please take these concerns seriously.
Oil and gas leasing on federal lands has become a much more serious risk to public health, safety, and the environment over the last few years with the increased use of unconventional and dangerous recovery techniques. Oil well operators have recently employed a variety of risky methods to extract resources from previously infeasible geologic formations. These oil and gas extraction methods, which include hydraulic fracturing, gravel packing, and acidization, involve the use hundreds of kinds of chemicals, many of which are known to be carcinogenic or otherwise harmful to human health. The utilization of these unconventional techniques presents new and more potent risks over those of conventional oil and gas extraction.
The EIS and Statewide Study should cover not only the particular method of extraction, but all aspects of exploration and development, including but not limited to: drilling rig mobilization, site preparation, and demobilization; completion rig mobilization and demobilization; well drilling; well completion; and well production. Equipment cleaning, maintenance, and repair also become necessary and necessitate additional chemical use and expand the risks from exposure.
The transportation of toxic chemicals also poses a risk if any trucks were to spill or otherwise leak contaminants due to accidents. The need for expansion of distribution and refining facilities will also contribute to the additional environmental impact that can be expected from allowing unconventional oil and gas extraction to proceed.
Unconventional oil and gas recovery also results in large amounts of waste fluid and produced water, byproducts that can potentially contaminate air, water, and soil and harm humans and wildlife
Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.
So-called "closed loop" systems, which store flowback in tanks, still have potential environmental impacts. Even with reduced emission completions, spills and fugitive emissions can still cause soil, water, and air contamination. Using tanks does not obviate the need for trucks and pipes to transport flowback and waste water fluid to offsite disposal facilities. As mentioned above, increased truck traffic also has deleterious effects on the environment through increased traffic, air emissions, and spills.
The EIS and Statewide Study Should Analyze All Chemicals Used in Oil and Gas Production Congress charged BLM with managing public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." BLM will not be able to adequately assess the environmental impacts of unconventional oil and gas recovery and fulfill these duties without full knowledge of the chemicals used in the process. To date, operators have been unwilling to disclose a full list of chemicals used in new techniques that involve injection of toxic chemicals underground. While some chemical ingredients are known through Material Safety Data Sheets and other sources, many are withheld from public disclosure under claims of trade secret protection. But BLM is not precluded from requiring the submission of such information. In fact, BLM is required to gather and disclose chemical information under the statutory mandates in NEPA, Federal Land Policy and Management Act, 42 USC. § 1701 et seq. ("FLPMA"), and other applicable law.
Moreover, under the directives of NEPA, BLM must ensure that Americans have a "safe [and] healthful" environment. Its actions must be taken "without degradation, risk to health or safety, or other undesirable and unintended consequences." All federal agencies must use "all practical means.. to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment." BLM thus has the clear authority and obligation to

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gather and disclose information on all chemicals used for activities on public lands.

The EIS and Statewide Study should examine the chemicals that are being injected underground as well as the chemicals that flow back to the surface. Full information on all substances that flow back up to the surface will allow BLM to identify harms particular to flowback fluid. Flowback fluid is comprised of a different mixture of chemicals because some naturally occurring, yet dangerous, chemicals that were previously contained in the subsurface will rise to the surface. These include heavy metals, salts, and naturally occurring radioactive materials ("NORMs"). Conversely, some chemicals may be more likely to remain underground and pose threats to underground water supplies and increase the risk of induced seismic activity. It is important to understand how different chemicals travel and mix throughout the extraction process in order to adequately identify particular risks

In addition to well stimulation process, chemicals are also used in other stages of oil and gas production. For example, a study found 22 chemicals used in the drilling process in Colorado gas development fields. Chemical dispersants might also be used in the event of a spill or other accident. These dispersants may be just as harmful as the spill itself. Another example is the discovery of methylene chloride being used as a cleaning solvent for equipment. This chemical was found in 73 percent of air samples in one study, but methylene chloride was not reported on any list of disclosed chemicals, despite its toxicity. The discovery of an undisclosed, harmful, and pervasive chemical underscores the need for BLM to conduct its own monitoring and measuring and not simply relying on reports from operators. Meaningful monitoring is made impossible when compounds used are unknown. Furthermore, contaminants cannot be traced back to their source if operators do not disclose which chemicals they use. Thus, anything short of full disclosure with regard to chemical information will violate NEPA and other applicable law while endangering public health and safety.

As for chemicals known to have been used in hydraulic fracturing, the list is as long as it is dangerous. A study of gas production in Colorado yielded 632 chemicals used in 944 different products. Of these chemicals, 75 percent have been shown to cause harm to the skin, eyes, and other sensory organs; 37 percent could affect the endocrine system; and 25 percent could cause cancer and mutations. Recent disclosure requirements adopted by the South Coast Air Quality Management District ("SCAQMD") in California revealed that operators engaged in unconventional oil and gas extraction in southern California, in just 30 days of reporting, used dozens of chemicals known to be air toxics over hundreds of occasions. BLM cannot complete an EIS or Statewide Study without understanding and documenting the full extent of the harms from each and every chemical used in the oil and gas extraction process. This applies to both known and currently unknown chemicals. It is thus important for BLM and the public to know the full array of chemicals used in the extraction process.

Chemical and Waste Transport

Unconventional well stimulation relies on numerous trucks to transport chemicals to the site as well as collect and carry disposal fluid from the site to processing facilities. A US GAO study found that up to 1,365 truck loads can be required just for the drilling and fracturing of a single well pad while the New York Department of Conservation estimated the number of truck trips to be about 3,950 per horizontal well. Accidents during transit may cause leaks and spills that result in the transported chemicals and fluids reaching surface waters. Chemicals and waste transported by pipeline can also leak or spill. The EIS and Statewide Study should evaluate how often such accidents can be expected to occur, and the effect of chemical and fluid spills.

On-site Chemical Storage and Processing

Chemicals that are being stored at unconventional well stimulation sites can also be susceptible to accidental spills and leaks. Natural occurrences such as storms and earthquakes may cause accidents, as can negligent operator practices. Recent floods in Colorado have shown how weather events may result in uncontrolled chemical spills and leaks on a massive scale.

Some sites may also use on-site wastewater treatment facilities. Improper use or maintenance of the processing equipment used for these facilities may result in discharges of contaminants.

In addition, recent reporting requirements implemented by the South Coast Air Quality Management District (SCAQMD) have shown that at least a dozen chemicals known to be air toxics have been used in hydraulic fracturing and other types of unconventional oil and gas recovery in California. Though the reporting requirements are relatively new, already operators have been forced to disclose the fact that they have been using several types of air toxics in California, including crystalline silica, methanol, hydrochloric acid,

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hydrofluoric acid, 2- butoxyethanol, ethyl glycol monobutyl ether, xylene, amorphous silica fume, aluminum oxide, acrylic polymer, acetophenone, and ethylbenzene. The EIS and Statewide Study should examine whether and to what extent these and other listed air toxics will be released into the air.
Many of these chemicals also appear on the US EPA's list of hazardous air pollutants. A study by the US House of Representatives' on chemicals used in hydraulic fracturing showed twenty-five chemicals regulated as hazardous air pollutants were used in hydraulic fracturing in various states across the country.
SCAQMD's list of air toxics refers to all chemicals included in California Health and Safety Code 44321, which include toxic air contaminants and federal hazardous air pollutants. The EIS and Statewide Study should study the potential harm from all the chemicals included in Section 44321 and any other pollutants that may pose a risk to human health.
Naturally occurring radioactive materials can be brought to the surface through drilling and extraction processes. The buildup of radioactive materials in pipes and equipment can accumulate to amounts that are harmful to workers who interact with the pipes and equipment. In Pennsylvania, researchers found high concentrations of the element radium, a highly radioactive substance, in water samples from streams. Concentrations were roughly 200 times higher than background levels. The EIS and Statewide Study should assess the amount, the type, and the potency of radioactive elements that are naturally occurring in federal lands and evaluate the likely risks that stem from bringing such materials to the surface.
A study of 353 identifiable chemicals used in hydraulic fracturing found that many caused harm to skin, eye and sensory organs; respiratory systems; gastrointestinal and liver systems; brain and nervous systems; immune systems, kidneys, and cardiovascular systems. The study also found certain chemicals were carcinogenic, mutagens, endocrine disruptors, and/or ecologically harmful. Chemicals used during the drilling process showed many of the same dangers. Chemicals identified in evaporation pits also were linked to the same array of harms.
The DEIS should include a comprehensive analysis of potential impacts to the quality of surface water and groundwater resources and evaluate the following activities for their impacts: o Waste management, including use, reuse, recycling and disposal of oil and gas produced and flowback water. o Impacts to shallow aquifers from oil and gas well drilling, well completion and production. o Management of spills or leaks from surface impoundments, oil and gas pits, or produced water evaporation ponds. o Erosion and sedimentation impacts associated with surface disturbance, including those associated with roads, well pad construction, well drilling and completion, and pipelines. - As part of completing the aforementioned evaluation, the following resource impacts should be discussed, including disclosure of which waters may be impacted, the nature of potential impacts, and specific pollutants likely to impact those waters: o Groundwater: Potential impacts to groundwater, including municipal or private water supplies. We recommend that this include an analysis of the management of any fluids that will be injected underground for well completion, including the toxicity and fate of these fluids, with a focus on avoiding surface spills or leaks of these fluids. o Impaired Waterbodies: Potential impacts to impaired waterbodies, including waterbodies listed on the CWA § 303(d) list and waterbodies with completed Total Maximum Daily Loads (TMDLs). o Surface Water Quality and Sedimentation: Potential impacts to water quality from runoff associated with surface disturbance. Erodible soils can represent a significant nonpoint source, and runoff could introduce sediments, as well as salts, selenium and other heavy metals into surface waters. To ensure sufficient information is included about the potential impacts of soil disturbance, we recommend that the DEIS include an estimate of erosion rates for each alternative in tons per year based on amount of surface disturbance, soil types, topography and slope, to avoid significant sedimentation.

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Studies such as the Endrocrine Society's 2013 study by Christopher D. Kassotis et al, entitled Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region, have concluded that the fracturing fluid used in hydraulic fracturing contains end ocrine disrupting chemicals, which are linked to increased instances of cancer, birth defects, decreased sperm quality and quantity, infertility and reproductive tract deformities. After hydraulic fracturing is completed, only 60 to 80 percent of the fracturing fluid is reclaimed. This means that the remaining 40 to 20 percent of the fluid remains underground has the potential to contaminate groundwater over time. Even though fracturing fluid is primarily made up of water, and chemicals constitute only a very small percentage, the chemicals are potent enough to have negative impacts even in low concentrations. Endocrine disrupters in particular are known for having impacts at very low levels, and they have the potential for exacerbated effects when mixed with other chemicals.
The 1996 Hollister RMP that this EIS could be amending established a hazardous materials and public safety objective of identifying and controlling imminent hazards or threats to human health and/or the environment from hazardous substances released on public lands.
Also, in spite of best intentions and best practices, it is logical to assume that there will be leaks and spills and harm to wildlife, given the caustic nature of the products involved.
Oil and gas drilling stimulation techniques that utilize hazardous materials result in more hazardous materials being transported on the roadways, stored on drilling sites and injected into the ground. It is the experience of the Environmental Health Bureau that it is difficult to obtain compliance from drilling companies with existing regulations regarding hazardous materials, therefore, expansion of drilling activities could result in increased contamination of soils and water with hazardous materials. The EIS should include analysis of the potential impacts due to this increased contamination.
Disposal of produced and wastewater generated during drilling activities is a problem faced by all areas where O&G extraction occurs. Although some methods of recycling make produced water from drilling activities available for agricultural uses, there is no guarantee of its quality, and this water is classified as not safe for human or animal consumption. Reinjection activities may further degrade the quality of groundwater sources, and increase the possibility of seismic activity. Well- defined and concise plans for disposal of wastewater will help protect the quality of surface and groundwater, and prevent seismic activity.
Naturally occurring radioactive elements in soils are found all over the world. It is necessary to understand the risks when these elements are brought to the surface by drilling activities. Dangers associated with exposure to radioactive elements by the public and the environment must be studied and mitigation plans put into place in case there is a release of any dangerous material on the surface.
NPS is also concerned about potential impacts to this area's scarce water resources both of water quality and quantity due to the disposal of oil development waste products and requirements for large quantities of water.
(6) The EIS must include a list of the chemicals that could be used in unconventional oil and gas production. These numerous toxic and corrosive chemicals may be spilled, leaked from pond or tank storage, or be pumped into the earth. No legitimate EIS can be prepared without including a thorough assessment of the risks posed by the use of these chemicals, both at the surface and deep in the earth. BLM has the legal authority to create regulations that permit the disclosure of this information, even for chemical information that would otherwise be considered a trade secret.
The EIS should study all environmental impacts made more severe by fracking and other types of unconventional oil and gas extraction. Fracking uses hundreds of undisclosed yet toxic chemicals. Numerous cases of contamination have been reported in places where fracking has occurred. The EIS must include a disclosure of the materials used in the fracking process and an analysis of the effects of these materials on human and wildlife health.
CHEMICALS USED IN HYDRAULIC FRACTURING http://www.conservation.ca.gov/dog/general_information/Documents/Hydraulic%20Fracturing%20Report%204%2018%2011.pdf

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Concerned about: Injection of hazardous chemicals into the biosphere.
Concerned about: Potential for dumping of hazardous chemical wastes without studies, documentation or controls.
The EIS should analyze potential wastewater disposal impacts on water and land resources and seismicity for unconventional oil and gas development.
The chemicals used in well stimulation activities and likely to be encountered in flowback and produced fluids should be identified and their impacts on drinking water and agricultural water should be analyzed.
In the various techniques of "well stimulation," including hydraulic fracturing or "fracking," toxic chemicals are mixed into water and pumped into the ground to release trapped oil and gas. These toxics pose a danger that the EIS must take into account, since well stimulation would probably be the primary means of extraction in BLM areas. When representatives of the oil and gas industry say that the toxic mixtures they pump into the earth will stay safely sequestered far underground and will not contaminate surface soil or aquifers, they are making a promise they cannot keep. For the moment, set aside the fact that contamination has occurred at numerous drilling sites, that significant amounts of fluid are regurgitated to the surface while the well is being worked, that toxic gases are released into the atmosphere from the ponds and tanks that hold those fluids, and that holding ponds typically leak. Consider only the long term, after the companies have abandoned the wells and moved on. The wells that they leave behind are themselves conduits through which toxics can come back to the surface. In time, all well casings fail, leaving open channels for contamination. Add in the prevalence of earthquakes, which produce new fissures in subsurface rock and can contort drilling channels, and it is a near certainty that well stimulation is a pathway to future ecological disasters. The bottom line is this: No one has a moral right - nor should they have a legal or regulatory right - to push toxic chemicals into the environment and leave them there.
Health Impacts: TAGs are defined as air pollutants that which may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health. The most common source of TAGs can be attributed to diesel exhaust fumes that are emitted from both stationary and mobile sources. Health impacts may require a detailed health risk assessment (HRA). Project related health impacts should be evaluated to determine if emissions of toxic air contaminants (TAG) will pose a significant health risk to nearby sensitive receptors.
I have recently moved to California from West Virginia. I have witnessed first hand the disaster that fracking has created in my home state. People whose home is literally the only asset they possess have been forced to move because they get sick from the fumes. The gas companies asirex us that it was safe, it would be fine. They lied! Air pollution terrible degradation of the environment, and radioactive waste that the landfills are in no way repaired to handle.
With regard to addressing "the environmental effects of chemicals, if any, used" in well stimulation (78 Fed.Reg. 47409), the EIS should draw on available information on the chemical composition of well stimulation fluid. The implementation of FracFocus, which WSPA fully supports, has effectively served to provide timely public information about the content of hydraulic fracturing fluid. In addition, S.B. 4 and interim implementing regulations require public disclosure regarding the base fluid and each additive contained in well stimulation fluids used, as well as the total volume of fluid used. 14 Cal. Code Regs. § 1788.
Pennsylvania- Fracking- finding radium levels 200 times greater. ref. http://rt.com/usa/fracking-rad ioactivity-contaminants-study-661/
Minerals and Mining
In addition, for unconventional oil and gas development, the EIS should map areas where the Monterey Shale and other shale resources exist and analyze where new oil and gas development is reasonably likely to occur.

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For both conventional and unconventional oil and gas development, the EIS should:

- Identify and map all existing oil and gas development in California, including all development on BLM-managed lands and sub-surface resources and all BLM existing oil and gas leased tracts in the state.

- Identify all existing wells in which well stimulation practices have been used, and, for these wells, any reports or information evidencing well failures, casing or cement failures, spills, or groundwater or surface contamination.

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Firstly, according to various studies, the fracturing fluid used in hydraulic fracturing contains endocrine disrupting chemicals, which are linked to increased instances of cancer, birth defects, decreased sperm quality and quantity, infertility and reproductive tract deformities. One example that sites these health side effects is the 2013 article published by the Endocrine Society, titled Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Groundwater in a Drilling-Dense Region, by Christopher D. Kassotis et al. Even though fracturing fluid is primarily made of water, and chemicals constitute only a very small percentage, the chemicals are able to have negative impacts even in low concentrations. This means that even if only trace amounts are detected, the harm to us and our children is simply not worth the risk. Please take these concerns seriously.

Oil and gas leasing on federal lands has become a much more serious risk to public health, safety, and the environment over the last few years with the increased use of unconventional and dangerous recovery techniques. Oil well operators have recently employed a variety of risky methods to extract resources from previously infeasible geologic formations. These oil and gas extraction methods, which include hydraulic fracturing, gravel packing, and acidization, involve the use hundreds of kinds of chemicals, many of which are known to be carcinogenic or otherwise harmful to human health. The utilization of these unconventional techniques presents new and more potent risks over those of conventional oil and gas extraction.

The increased utilization of unconventional oil and gas extraction techniques also increases the overall amount of oil and gas development in the state. Moreover, the use of unconventional techniques increases the spatial intensity of oil and gas wells. Multi-well pads and a higher density of wells become viable when operators begin to use unconventional oil and gas extraction techniques. Thus, the public health and safety and environmental problems stemming from traditional oil and gas development will only be exacerbated by allowing oil and gas activity to reach new areas that would otherwise remain untouched. Permitting unconventional extraction methods on public lands may also extend the life of pre-existing wells and in the process increase the risk of harm.

The EIS and Statewide Study Should Examine All Methods of Unconventional Resource Extraction.

The EIS should encompass all methods of unconventional oil and gas extraction and production. Although hydraulic fracturing has been the primary focus of the litigation prompting this review and has garnered the most attention from the public, well stimulation and underground injection techniques can vary widely. Examples include acidization, acid hydraulic fracturing, and gravel packing. Each of these techniques raises a unique yet dangerous set of concerns and potential impacts on human health, safety, and the environment. The EIS and Statewide Study must address all types of unconventional oil and gas recovery that may be utilized in California.

BLM must analyze not only the well completion or stimulation, but also the various preceding, concurrent, and subsequent activities that surround oil and gas extraction. Oil and gas leases affect the environment not only through the well stimulation and recovery processes, but also through related activities needed to drill, construct, operate, maintain, monitor, and shut down each well. Each stage of the oil and gas extraction and recovery process carries its own set of public health, safety, and environmental concerns.

In addition to well stimulation process, chemicals are also used in other stages of oil and gas production. For example, a study found 22 chemicals used in the drilling process in Colorado gas development fields. Chemical dispersants might also be used in the event of a spill or other accident. These dispersants may be just as harmful as the spill itself. Another example is the discovery of methylene chloride being used as a cleaning solvent for equipment. This chemical was found in 73 percent of air samples in one study, but methylene chloride was not reported on any list of disclosed chemicals, despite its toxicity. The discovery of an undisclosed, harmful, and pervasive chemical underscores the need for BLM to conduct its own monitoring and measuring and not simply relying on reports from operators. Meaningful monitoring is made impossible when compounds used are unknown. Furthermore, contaminants cannot be traced back to their source if operators do not disclose which chemicals they use. Thus, anything short of full disclosure

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with regard to chemical information will violate NEPA and other applicable law while endangering public health and safety.
As for chemicals known to have been used in hydraulic fracturing, the list is as long as it is dangerous. A study of gas production in Colorado yielded 632 chemicals used in 944 different products. Of these chemicals, 75 percent have been shown to cause harm to the skin, eyes, and other sensory organs; 37 percent could affect the endocrine system; and 25 percent could cause cancer and mutations. Recent disclosure requirements adopted by the South Coast Air Quality Management District ("SCAQMD") in California revealed that operators engaged in unconventional oil and gas extraction in southern California, in just 30 days of reporting, used dozens of chemicals known to be air toxics over hundreds of occasions. BLM cannot complete an EIS or Statewide Study without understanding and documenting the full extent of the harms from each and every chemical used in the oil and gas extraction process. This applies to both known and currently unknown chemicals. It is thus important for BLM and the public to know the full array of chemicals used in the extraction process.
In short, knowing the exact identities, quantities, concentrations, and migration paths of all chemicals will help BLM determine the scope and extent of risks to human health, safety and the environment. Incomplete knowledge in these areas will result in an inadequate EIS and Statewide Study.
Surface water contamination Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, described above, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners. As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities. The EIS and Statewide Study should fully assess the risk of harm to surface waters as well as the feasibility of restoring the original water quality once surface water is contaminated.
The migration may occur over a number of years. Thus, the EIS and Statewide Study must include long-term studies on the frequency and effect of fluid migration through newly created subsurface pathways. Fluid migration is of particular concern when oil and gas operations are close to drinking water supplies. Unfiltered drinking water supplies especially at risk because they have no readily available means of removing contaminants from the water. Even water supplies with filtration systems are not designed to handle the kind of contaminants that result from unconventional oil and gas extraction.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Nitrogen oxides (NOx) react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. NOx and volatile organic compounds react in the presence of heat and sunlight to form ozone.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Particulate matter (PM) - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, increased mortality, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Sulfur Dioxide (SO2) - has been shown to cause an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations

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including children, the elderly, and asthmatics.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Carbon Monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death. Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Ozone (O3) can trigger or worsen asthma and other respiratory ailments. Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Ozone may also lead to loss of species diversity and changes to habitat quality, water cycles, and nutrient cycles.
Air toxics and hazardous air pollutants, by definition, can result in harm to human health and safety. The full extent of the health effects of exposure is still far from being complete, but already there are numerous studies that have found these chemicals to have serious health consequences for humans exposed to even minimal amounts. The range of illnesses that can result are summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses. Other studies and reports have confirmed the pervasive and extensive amount of chemicals that have the potential to cause health risks by being emitted into the air.
The EIS and Statewide Study should incorporate BLM's own literature review of the harmful effects of each of these chemicals known to be used in hydraulic fracturing and other unconventional oil and gas extraction methods. Without knowing the effects of each chemical, an EIS or Statewide Study cannot accurately project the true impact of unconventional oil and gas extraction on public lands.
The EIS and Statewide Study must fully analyze the impact of unconventional oil and gas extraction on the biggest and most challenging environmental problem of our time: climate change. The first goal listed under NEPA is to "fulfill the responsibilities of each generation as trustee of the environment for succeeding generations." Expansion of oil and gas production into California's federal lands will substantially increase the volume of greenhouse gases emitted into the atmosphere and jeopardize the sustainability of the environment and the health and well being of future generations. In order to avoid catastrophic climate change, BLM should be looking for ways to reduce, rather than increase, greenhouse gas emissions.
Naturally occurring radioactive materials can be brought to the surface through drilling and extraction processes. The buildup of radioactive materials in pipes and equipment can accumulate to amounts that are harmful to workers who interact with the pipes and equipment. In Pennsylvania, researchers found high concentrations of the element radium, a highly radioactive substance, in water samples from streams. Concentrations were roughly 200 times higher than background levels. The EIS and Statewide Study should assess the amount, the type, and the potency of radioactive elements that are naturally occurring in federal lands and evaluate the likely risks that stem from bringing such materials to the surface.
The dangers listed above are described primarily in the context of the potential to affect human health. For example, water contamination is a danger because humans can ingest the water and develop a variety of ailments. The EIS and Statewide Study should include a health impact assessment, or equivalent, of the aggregate impact that hydraulic fracturing and other unconventional extraction techniques will have on human health. Studies have shown the chemicals used in unconventional oil and gas extraction have caused increased risk of sickness, chronic disease, cancer, and even death. The EIS and Statewide Study must examine the full array of potential human health and safety impacts when studying each of the harms listed above.

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In addition, the EIS and Statewide Study should study the human health and safety impacts of noise pollution, light pollution, and traffic accidents resulting from oil and gas leases on federal land.
A study of 353 identifiable chemicals used in hydraulic fracturing found that many caused harm to skin, eye and sensory organs; respiratory systems; gastrointestinal and liver systems; brain and nervous systems; immune systems, kidneys, and cardiovascular systems. The study also found certain chemicals were carcinogenic, mutagens, endocrine disruptors, and/or ecologically harmful. Chemicals used during the drilling process showed many of the same dangers. Chemicals identified in evaporation pits also were linked to the same array of harms.
Conversely, continuing to allow oil and gas extraction, including unconventional methods, would run counter to many if not all of the stated objectives in the current Hollister RMP. For example, it is impossible to "protect public health and safety and environmental resources by minimizing environmental contamination from past and present land uses..on public lands" while allowing extreme oil and gas extraction to endanger public health and safety and the environment. Similarly, it is difficult to reconcile the Hollister RMP's goal to "maintain, restore, or improve water quality and quantity to sustain the designated beneficial uses on BLM lands" without consideration of a complete ban on oil and gas extraction techniques that pose grave threats to water quality and supply.
The alternatives considered in the EIS must include at a minimum, cancellation of the 2011 and 2012 Hollister Field Office lease sales subject to litigation, and, more broadly, a prohibition on all oil and gas activities in areas managed by the Hollister Field Office as well as a prohibition on all unconventional oil and gas activities in areas managed by the Hollister Field Office. A prohibition on all oil and gas activities is the only option that will completely eliminate the risk of several of the harms described above. Revisions to the Hollister office's RMP should be implemented after a full consideration of the EIS and Statewide Study in order to protect people, wildlife, and our public lands from the many risks and damages of oil and gas extraction.
Identify any sensitive receptors in the project area, such as children, elderly, and the infirm, and specify the means by which impacts to these populations will be minimized (e.g. locate construction equipment and staging zones away from sensitive receptors and building air intakes).
Coccidioidomycosis, (kok-sid-oy-doh-my-KOH-sis), or Valley Fever, is a fungal infection that is almost always acquired from the environment via the inhalation of fungal spores. It can affect humans, many species of mammals and some reptiles.10 The fungus, Coccidioides, is endemic (native and common) in the soil of the southwestern United States, Mexico, and parts of Central and South America. Coccidioides can live for long periods of time in soil under harsh environmental conditions including heat, cold, and drought. Coccidioides can be released into the air when soil containing the fungus is disturbed, either by strong winds or activities such as farming or construction. Distribution of the fungus is typically patchy, but in some "hot spots," up to 70% of the human population has been infected. The number of reported Valley Fever cases in the US has risen from less than 5,000 in 2001 to more than 20,000 cases in 2011. An estimated 150,000 more cases go undiagnosed every year. The majority of reported cases are located in Arizona and California. The reason for the recent increase in cases, however, is unclear. Dust storms in endemic areas are often followed by outbreaks of coccidioidomycosis. If the dust storms are severe, the fungal spores can be carried outside the endemic area into neighboring counties, where outbreaks follow. According to the Centers for Disease Control and Prevention, workers engaged in soil-disturbing activities in endemic areas should be considered at risk for the disease. Occupational groups at risk include farmers, agricultural workers, construction workers and archaeologists. Some groups of people appear to be at increased risk for disseminated disease and can become seriously ill when infected. People at risk for severe disease include those with weakened immune systems, persons with cancer or who are on chemotherapy, or persons who are HIV-infected. Also at higher risk for serious illness are the elderly, persons of African or Filipino descent, and women in the third trimester of pregnancy.
The EPA recommends that the DEIS assess potential exposures to the fungus, Coccidioides, and susceptibilities of workers and nearby residents to Valley Fever due to soil-disturbing activities of the project.
That an Environmental Awareness Program for the workers be implemented and it should include training on the health hazards of Valley Fever, how it is contracted, what symptoms to look for, proper work procedures, how to use personal protective equipment, the need to wash prior to eating, smoking or drinking and at the end of the shift,

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and the need to inform the supervisor of suspected symptoms of work-related Valley Fever. The training should identify those groups of individuals most at risk and urge individuals to seek prompt medical treatment if Valley Fever symptoms (flu-like illness with cough, fever, chest pain, headache, muscle aches, and tiredness) develop.
In addition to regulatory required fugitive dust controls, the Applicant should: - Avoid areas that may harbor the fungus if practicable. - Restrict high risk workers from contaminated areas if possible. - Test soils to be disturbed for presence of the cocci fungus, understanding that even in known endemic areas, the distribution of the fungus in the soil is sporadic and very limited. - Require that grading and construction equipment cabs be enclosed, HEPA ventilated, and air-conditioned. - Use personal protective equipment in dusty work areas: o Disposable clothing. o Method to clean work boots at the end of the shift. o NIOSH certified N95 respirator, at a minimum or one with a higher protection factor. - Provide personal hygiene (washing) facilities. - Require crews to work upwind from excavation sites. - Pave construction roads. - Minimize ground disturbance as much as possible. Revegetate temporarily disturbed areas promptly. - Discourage workers from carrying any fomites home with them. Institute hygiene measures to limit dust transport offsite. - Consider limiting visitor site access without proper training or personal protective equipment. - Prohibit work activities when wind speeds exceed 25 mph. - Consider mitigation measures that would provide advanced notification to sensitive receptors of the potential effects of a Coccidioides infection. - Contact the local or state public health agency to better understand the incidence of Coccidioidomycosis in the project area and surrounding region. Provide local public health officials with a schedule of project activities that disturb soil. Ensure local physicians consider Coccidioidomycosis in diagnoses involving flu or flu-like symptoms.
Studies such as the Endrocrine Society's 2013 study by Christopher D. Kassotis et al, entitled Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region, have concluded that the fracturing fluid used in hydraulic fracturing contains end ocrine disrupting chemicals, which are linked to increased instances of cancer, birth defects, decreased sperm quality and quantity, infertility and reproductive tract deformities. After hydraulic fracturing is completed, only 60 to 80 percent of the fracturing fluid is reclaimed. This means that the remaining 40 to 20 percent of the fluid remains underground has the potential to contaminate groundwater over time. Even though fracturing fluid is primarily made up of water, and chemicals constitute only a very small percentage, the chemicals are potent enough to have negative impacts even in low concentrations. Endocrine disrupters in particular are known for having impacts at very low levels, and they have the potential for exacerbated effects when mixed with other chemicals.

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In the 2012 study, "Impacts of Gas Drilling on Human and Animal Health" Bamberger and Oswald found exposure to the chemicals used in hydraulic fracturing to be linked to negative respiratory, gastrointestinal, dermatologic, immunologic, reproductive, and endocrine human and animal health effects.
Oil and gas drilling also results in impacts on air quality which could have consequences for human health. In a study titled Human health risk assessment of air emissions from development of unconventional natural gas resources (McKenzie et al 2012) found that it is likely that oil and gas drilling operations emit petroleum hydrocarbons and VOCs, the inhalation of which is linked to irritation of the eyes, nose, and throat, breathing difficulties, cancer, childhood leukemia, blood disorders, and nervous system impairment.
I am a nurse and very concerned about the risks to human health associated with fracking. A study by McKenzie et al 2012 found that this kind of drilling is linked to several health-compromising conditions such as childhood leukemia, cancer, and nervous system illnesses.
The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include Accidents- Recent oil-carrying train accidents in the US and Canada demonstrate the dangers of transporting oil.
BLM land should be closed, in particular to oil and gas development that involves hydraulic fracturing. There are too many unknowns about the impacts of hydraulic fracturing at this point for the BLM to properly analyze the impacts of fracking in the EIS. New studies have been released as recently as December 2013 (such as Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region Kassotis et al. 2013) on the negative impacts hydraulic fracturing has on public health and safety and on water and air quality.
Oil and gas drilling also results in impacts on air quality that could be harmful to human health. A study by McKenzie et al 2012 called Human health risk assessment of air emissions from development of unconventional natural gas resources found that it is likely that the pollutants emitted in oil and gas drilling operations cause eyes, nose and throat irritation as well as respiratory issues. These pollutants could also lead to cancer and leukemia.
The 1996 Hollister RMP that this EIS could be amending established a hazardous materials and public safety objective of identifying and controlling imminent hazards or threats to human health and/or the environment from hazardous substances released on public lands.
Due to the negative impacts to surface water and groundwater, to air quality, and to human health through exposure to endocrine disruptors and other chemicals present in fracking fluids, it will be impossible for the BLM to reach these RMP objectives while using hydraulic fracturing as an oil and gas extraction method.
California's SB4 requires the regulation of all well stimulation techniques, including acidizing, which will be the technique used for O&G extraction in the state. SB4 also requires the disclosure of all chemicals used during drilling operations. It is imperative that the BLM include similar rules and regulations for use in public lands in California. Doing so will help protect public health, the environment, respect the will of the people of California, and ensure that O&G development in the state will be conducted in a safe and responsible manner.
California suffers from some of the worst air pollution in the country. Facilities classified as sensitive receptors, such as schools and residences, are found throughout rural areas where public lands are located. These areas will be exposed to high levels of exhaust and emissions from construction and operations, adversely impacting public health and air quality. Cumulative contributions of emissions that will reduce air quality must be properly evaluated to ensure that public health is protected, and determine whether proposed O&G development will conflict with implementation of plans for air quality attainment under applicable state and federal laws.
Increased traffic on underdeveloped and rural roads, along with increased construction and operation activities, will have a detrimental impact on air quality and other resources. A complete cumulative impacts study is necessary in order to fully analyze the results of increased O&G development in these areas, such as decreased land use for agriculture, cattle grazing, and recharge areas for groundwater.

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The EIS must encompass all methods of unconventional oil and gas extraction and production. Although hydraulic fracturing or fracking has been the primary focus of public attention and litigation, well stimulation and underground injection techniques can vary widely. Examples include acidization, acid hydraulic fracturing, gravel packing and the extravagantly broad range of chemicals that drillers have used to stimulate oil and gas wells.

Each of these techniques and classes of chemicals raise a new set of concerns and potential impacts on human health, safety, and the environment. The EIS and Statewide Study must address all types of unconventional oil and gas recovery that may be utilized in California. Because the Monterey Shale and California fracking "oil play" has just begun, it is not clear which techniques of fracking, well stimulation, horizontal drilling and so forth, are likely to be used within the jurisdiction of BLM. For this reason your agency must assess and anticipate in the EIS, all possible forms of "fracking" and unconventional oil and gas drilling that may be used. Certainly the oil industry itself could be a productive source of such information.

The expanded use of fracking and other unconventional methods of oil and gas extraction have become an additional area of concern. Fracking typically involves the use of hundreds of chemicals, many of which are known to have adverse human health effects, including the potential to cause cancer. In communities across the country, people have been exposed to these toxins through the air or water, and studies suggest a connection between fracking and an array of illnesses afflicting those nearby.

But fracking is just the tip of the iceberg in California. I'm even more concerned about matrix acidization, a process that is believed to be very effective for extracting fuel from the Monterey Shale. Good for oil companies, and bad for people. This technique involves pumping large quantities of hydrofluoric acid into the ground.

Hydrofluoric acid dissolves glass and concrete. It also dissolves rock which is why oil companies find it useful. And it dissolves people, from the inside out. If you get it on your skin, it goes straight to the bone. We don't want truckloads of hydrofluoric acid going up and down the freeway.

Approval of fracking Monterey shale oil on BLM land will impact not only our health and local diversity but, continued federal subsidy and development of carbon generating fossil fuels will push us further towards the larger climate change question of whether or not there will be future generations.

There are risks to transportation of crude oil or toxic water waste on winding rural roads and highways. Further risks are involved with crude oil transportation by rail- the preferred method of transportation by oil refineries. We have already witnessed numerous tragic accidents, with long term consequences, throughout the US and Canada.

Inherent in oil and gas fracking are pollutants that degrade the quality of our air, soil and water. All of the chemicals transported on public roads, stored and used must be disclosed and the health risks evaluated. The Environmental impact statement must include all short and long term risks of environmental degradation. Not only must all chemicals be disclosed, for the health and safety of surrounding environs, their storage should be regulated and monitored by third party experts.

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the EIS should include accident scenarios that consider what the impacts would be if certain safety measures fail. The EIS should also discuss what measures are in place to prevent accidents, and what the instances historically are of these accidents occurring (i.e. instances of fracturing fluid being spilled while in transport, instances of well casing breaches, etc.)

The BLM should consider a risk assessment as a separate supporting document to the EIS that utilizes existing data on all of the possible accident scenarios and quantifies the risks of those impacts based on the outcomes of that assessment (i.e. a risk assessment that considers the impacts with a 5% chance of well breach and aquifer contamination, one that considers the impacts if the risk of well breach is 2%, etc.)

The EIS must explain all health and safety impacts of the accident scenarios and all the socioeconomic impacts

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In analyzing the public health and safety impacts of oil and gas development, the EIS must consider the recent Endocrinology study that reported the presence of endocrine disruptors, which are linked to cancer, birth defects, reproductive tract deformities, infertility, and decreased sperm quality and quantity, in fracturing fluid (Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region, by C.D. Kassotis, D.E Tillitt, J.W. Davis, A.M. Hormann and S.C. Nagel, 2013. The Endocrine Society)

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In analyzing impacts of oil and gas development on water quality, soil and water contamination, public health and safety, hazardous materials, and socioeconomics, discuss the results of the paper, Fluid Migration Mechanisms due to Faulty Well Design and/or Construction: An Overview and Recent Experiences in the Pennsylvania Marcellus Play, by Anthony R. Ingraffea, that reported the increasing rate of well failure in the Marcellus Play between 2010-2012, with a well failure rate in 2012 of 7.2%.
Include in the analysis the results of the New Solutions study that found that exposure to the chemicals used in fracturing fluid is linked to negative neurologic, endocrine, dermatologic, gastrointestinal, respiratory, and reproductive health outcomes (Impacts of Gas Drilling on Human and Animal Health, M. Bamberger and R.E. Oswald, 2012, New Solutions)
It is TOTALLY IRRESPONSIBLE and UNFORGIVABLE to JEOPARDIZE THE PUBLIC HEALTH AND WELFARE OF ALL CALIFORNIANS BY PERMITTING FRACKING- THE MOST DANGEROUS AND TOXIC PRACTICE TO OBTAIN CRUDE OIL PARTICULARLY WHEN THE ADMINISTRATION PROMISED GREEN ENERGY. SAVE CALIFORNIA FROM THIS HORRIBLE PRACTICE.
The oil and gas available by fracking is not worth the price in public health and safety.
These dangerous extraction techniques threaten our health, safety, and environment in numerous ways, each deserving of a thorough assessment. The impacts include surface and groundwater contamination, water resource depletion, air contamination, induced seismic activity, light and noise pollution, increased truck traffic, and the contribution to catastrophic climate change. Each of these can lead to a detrimental effect on human health and safety as well as harm to plants and animals and their habitats.
Health Impacts: TAGs are defined as air pollutants that which may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health. The most common source of TAGs can be attributed to diesel exhaust fumes that are emitted from both stationary and mobile sources. Health impacts may require a detailed health risk assessment (HRA). Project related health impacts should be evaluated to determine if emissions of toxic air contaminants (TAG) will pose a significant health risk to nearby sensitive receptors.
Prior to conducting an HRA [health risk assessment], an applicant may perform a prioritization on all sources of emissions to determine if it is necessary to conduct an HRA. A prioritization is a screening tool used to identify projects that may have significant health impacts. If the project has a prioritization score of 1.0 or more, the project has the potential to exceed the District's significance threshold for health impacts of 10 in a million and an HRA should be performed.
If an HRA [health risk assessment] is to be performed, it is recommended that the project proponent contact the District to review the proposed modeling approach. The project would be considered to have a significant health risk if the HRA demonstrates that project related health impacts would exceed the District's significance threshold of 10 in a million.
For both conventional and unconventional oil and gas development, the EIS should: - Identify and map all existing oil and gas development in California, including all development on BLM-managed lands and sub-surface resources and all BLM existing oil and gas leased tracts in the state. - Identify all existing wells in which well stimulation practices have been used, and, for these wells, any reports or information evidencing well failures, casing or cement failures, spills, or groundwater or surface contamination.
If historic accident rates aren't available, the EIS must justify how such activities can be approved without a thorough risk analysis
Consider the impacts of seismic activity induced by wastewater injection would have on socioeconomics, public health and safety, and water quality.
Fracking is a serious threat to public health and the climate.

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The side effects of fracking are not yet known- or maybe known to the companies doing the work, but they are certainly not volunteering the information. Damage to underground water supplies, poisoning farmland and wildlife, and long-term human health impacts have all been reported. Please do not allow these little understood risks to be forced upon Californians without more studies and safeguards. Once risks are identified, the companies doing the fracking should be obliged to pay for all remedies, such as increased health care costs, restoration of water supplies, etc.

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Fish
Harm to Aquatic Life and Habitats When streams and other surface waters are depleted, the habitat for countless plans and animals will be harmed and place tremendous pressure on species that depend on having a constant and ample stream of water. Physical habitats such as banks, pools, runs, and glides (low gradient river sections) are important yet susceptible to disturbance with changing stream flows. Altering the volume of water can also change the water's temperature and oxygen content, harming some species that require a certain level of oxygenated water. Decreasing the volume of streamflow and stream channels by diverting water to hydraulic fracturing would have a negative impact on the environment and should be included in an EIS and Statewide Study.
Accidental spills or intentional dumping of wastewater can contaminate surface water and cause large-scale harm to wildlife. Numerous incidents of wastewater contamination from pipelines, equipment blowouts, and trucks accidents have been reported, and have resulted in kills of fish, aquatic invertebrates, and trees and shrubs, as well as negative health effects for wildlife and domestic animals. For example, a company recently admitted to dumping wastewater from hydraulic fracturing operations into the Acorn Fork Creek in Kentucky, causing a massive fish kill. Among the species harmed was the blackside dace, a threatened minnow species. The discharge of fracking wastewater into the Susquehanna River in Pennsylvania is suspected to be the cause of fish abnormalities, including high rates of spots, lesions, and intersex. In West Virginia, the permitted application of hydrofracturing fluid to an area of mixed hardwood forest caused extensive tree mortality and a 50-fold increase in surface soil concentrations of sodium and chloride.
Aquatic invasive species may also spread more easily given the large amounts of freshwater that must be transported to accommodate new drilling and extraction techniques. These species may be inadvertently introduced to new habitats when water is discharged at the surface. Alternatively, hoses, trucks, tanks, and other water use equipment may function as conduits for aquatic invasive species to access new habitats.
Special Status Species
Oil and gas development has been linked to population-level impacts on wildlife, including lower reproductive success of sage grouse and declines in the abundance of songbirds and aquatic species. For example, young greater-sage grouse avoided mating near infrastructure of natural-gas fields, and those that were reared near infrastructure had lower annual survival rates and were less successful at establishing breeding territories compared to those reared away from infrastructure. In Wyoming, an increasing density of wells was associated with decreased numbers of Brewer's sparrows, sage sparrows, and vesper sparrows. In the Fayetteville Shale of central Arkansas, the proportional abundance of sensitive aquatic taxa, including darters, was negatively correlated with gas well density.
Federal lands in California are also home to many endangered and threatened species. The EIS and Statewide Study must fully assess whether any of these protected species will be adversely affected by an increase in oil and gas activity on public lands. BLM's regulations may have an impact on some of these species and thus should include a full assessment of the potential harm in its EIS and Statewide Study. Moreover, the federal Endangered Species Act requires BLM to consult with the US Fish and Wildlife Service to ensure that its activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats.
Currently, hundreds of species in California are listed by the state or federal government as being endangered or threatened, and many others are candidates for addition to the list. These species, which include iconic species such as the California condor and the San Joaquin kit fox, are highly vulnerable and warrant protection from activities that may cause harm to their diminished populations.
The BLM should conduct a full assessment of the direct and indirect impacts of oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.

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Vegetation – General
The indirect effects from oil and gas development can often be far greater than the direct disturbances to habitat. The impacts from the well site- including noise, light, and pollution-- extend beyond the borders of the operation site and will consequently render even greater areas uninhabitable for some wildlife. Species dependent on having an "interior" habitat will lose their habitat if operation sites or other infrastructure abuts previously secluded areas. These and other indirect effects can be far greater than the direct disturbances to land. The NYSGEIS estimated that gas wells can indirectly affect over ten times the acreage as their direct footprint. In the Marcellus shale of Pennsylvania, 8.8 acres of forest on average were cleared for each drilling pad along with associated infrastructure, but after accounting for ecological edge effects, each drilling station actually affected 30 acres of forest. In the Big Piney-LaBarge field in Wyoming, only 4 percent of land is occupied by oil and gas infrastructure, but 97 percent of the total area is within one quarter mile of some type of infrastructure, which creates an enormous stress on natural habitats for plants and animals.
Accidental spills or intentional dumping of wastewater can contaminate surface water and cause large-scale harm to wildlife. Numerous incidents of wastewater contamination from pipelines, equipment blowouts, and trucks accidents have been reported, and have resulted in kills of fish, aquatic invertebrates, and trees and shrubs, as well as negative health effects for wildlife and domestic animals. For example, a company recently admitted to dumping wastewater from hydraulic fracturing operations into the Acorn Fork Creek in Kentucky, causing a massive fish kill. Among the species harmed was the blackside dace, a threatened minnow species. The discharge of fracking wastewater into the Susquehanna River in Pennsylvania is suspected to be the cause of fish abnormalities, including high rates of spots, lesions, and intersex. In West Virginia, the permitted application of hydrofracturing fluid to an area of mixed hardwood forest caused extensive tree mortality and a 50-fold increase in surface soil concentrations of sodium and chloride.
Anthropogenic climate change poses a significant threat to biodiversity. Climate disruption is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extinctions. Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to significantly increase extinction risk for many species. The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999. Other studies have predicted similarly severe losses: 15%-37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario; the extinction of 10% to 14% of species by 2100 if climate change continues unabated; and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species. Because expansion of oil and gas production into California's federal lands will substantially increase the emissions of greenhouse gases, this activity will further contribute to the harms from climate change to wildlife and ecosystems.
The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include o Habitat Destruction- Oil and gas development harms plants and animals, including endangered and threatened species. Industrial activity destroys habitat and harms delicate ecosystems where drilling and other oil and gas activity occurs.
Biological Resources. While most well stimulation activity occurs below ground or within the immediate vicinity of the well and well pad, such operations can still dramatically affect surface resources. Biological resources are likely to be subjected to new environmental impacts because advances in well stimulation technology will likely enable exploration and extraction of unconventional oil and gas resources that heretofore have not been exploited in areas that historically have not seen this industry. The potential impacts to these resources stems from the well stimulation treatments themselves, the disposal of waste water from such activity, the transport of materials to and from the well site, the drilling of new wells, and construction of roads, pipelines and other associated infrastructure. The EIS should analyze both the direct and indirect land use impacts of expanded (conventional and unconventional) oil and gas development on biological resources. In particular, the EIS should: - Identify the presence and habitat of sensitive, rare, and threatened, and endangered species under the Endangered Species Act, including rare and listed plant species and Species of Concern identified by the Bureau of Land Management, within BLM-managed lands and resources overlying or including the Monterey Shale formation as well as other conventional and unconventional plays, and assess the likelihood that these resources would be affected by oil and gas field development, including but not limited to impacts

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from habitat loss, fragmentation, sedimentation in freshwater and marine systems, and water use (e.g., withdrawal of groundwater).

- Identify wildlife corridors within areas likely to see oil and gas development and assess impacts to these corridors.

- Examine potential impacts on USFWS recovery plans

Vegetation – Weeds

Executive Order 13112, Invasive Species (February 3, 1999), mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. Executive Order 13112 also calls for the restoration of native plants and tree species. If the proposed project will entail new landscaping, the DEIS should describe how the project will meet the requirements of Executive Order 13112. In addition, we encourage alternative management practices that limit herbicide use, focusing instead on other methods to limit invasive species vegetation and decrease fire risk, and using herbicides only as a last resort.

The DEIS should describe the invasive plant management plan used to monitor and control noxious weeds. If herbicides will be used to manage vegetation, the DEIS should disclose the projected quantities and types of chemicals. The invasive plant management plan should identify methods that can be used to limit the introduction and spread of invasive species during and post-construction. These measures can include marking and avoidance of invasives, timing construction activities during periods that would minimize their spread, proper cleaning of equipment, and proper disposal of woody material removed from the site.

Because construction measures may not be completely effective in controlling the introduction and spread of invasives, the DEIS should describe post-construction activities that will be required, such as surveying for invasive species following restoration of the construction site and measures that will be taken if infestations are found.

Wildlife

On May 31, 2013, the US District Court for the Northern District of California ruled in Center for Biological Diversity v. Bureau of Land Management that BLM violated the National Environmental Policy Act3 ("NEPA") in issuing oil and gas leases without first analyzing the full extent of extreme extraction techniques such as hydraulic fracturing. Where such activity has occurred in other states, the environmental impact has been considerable. Water, air, soil, wildlife, and the climate have all been harmed by the expansion of unconventional extraction methods.

Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.

Harm to Aquatic Life and Habitats

When streams and other surface waters are depleted, the habitat for countless plans and animals will be harmed and place tremendous pressure on species that depend on having a constant and ample stream of water. Physical habitats such as banks, pools, runs, and glides (low gradient river sections) are important yet susceptible to disturbance with changing stream flows. Altering the volume of water can also change the water's temperature and oxygen content, harming some species that require a certain level of oxygenated water. Decreasing the volume of streamflow and stream channels by diverting water to hydraulic fracturing would have a negative impact on the environment and should be included in an EIS and Statewide Study.

The physical equipment itself that is designed to intake and divert water may also pose a threat to certain wildlife. If not properly designed, such equipment and intake points may be a risk to wildlife.

Surface water contamination

Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, described above, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners. As described below, contaminated surface water can result in many adverse

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effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities. The EIS and Statewide Study should fully assess the risk of harm to surface waters as well as the feasibility of restoring the original water quality once surface water is contaminated.
The EIS and Statewide Study should evaluate the full environmental impact of oil and gas activity on wildlife species and ecosystems. Depending on the area and the species, wildlife can be affected from oil and gas activity in a variety of ways. The expansion of oil and gas development activities on public lands will likely lead to harm through habitat destruction and fragmentation, stress and displacement caused by development-related activities (e.g., construction and operation activities, truck traffic, noise and light pollution), surface water depletion, water and air contamination, introduction of invasive species, and climate change. These harms can result in negative health effects and population declines. Studies and reports of observed impacts to wildlife from unconventional oil and gas extraction activities are summarized in Appendix B.
Oil and gas development creates a network of well pads, roads, pipelines, and other infrastructure that lead to direct habitat loss and fragmentation, as well as displacement of wildlife from these areas due to increased human disturbance. Habitat loss can occur as a result of a reduction in the total area of the habitat, the decrease of the interior-to-edge ratio, isolation of one habitat fragment from another, breaking up of one habitat into several smaller patches of habitat, and decreasing the average size of a habitat patch. In the western United States, the amount of high-quality habitat for the pronghorn, for example, has shrunk drastically due to oil and gas development.
The indirect effects from oil and gas development can often be far greater than the direct disturbances to habitat. The impacts from the well site- including noise, light, and pollution-- extend beyond the borders of the operation site and will consequently render even greater areas uninhabitable for some wildlife. Species dependent on having an "interior" habitat will lose their habitat if operation sites or other infrastructure abuts previously secluded areas. These and other indirect effects can be far greater than the direct disturbances to land. The NYSGEIS estimated that gas wells can indirectly affect over ten times the acreage as their direct footprint. In the Marcellus shale of Pennsylvania, 8.8 acres of forest on average were cleared for each drilling pad along with associated infrastructure, but after accounting for ecological edge effects, each drilling station actually affected 30 acres of forest. In the Big Piney-LaBarge field in Wyoming, only 4 percent of land is occupied by oil and gas infrastructure, but 97 percent of the total area is within one quarter mile of some type of infrastructure, which creates an enormous stress on natural habitats for plants and animals.
While individual well sites may cause some disturbance and destruction, the cumulative impacts of oil and gas production using unconventional methods must receive attention as well. While the actual well pads may only occupy a small proportion of a particular habitat, their impact can be much greater when their aggregate impact is considered. As discussed above, interior habitats will be destroyed by removing the buffer between the interior habitat and the operation site.
Water depletion can also affect species whose habitats are far removed from the actual well site. Because of the high volume of water required for even a single well that uses unconventional extraction methods, the cumulative water depletion could have a significant impact on species that rely on water sources that serve to supply oil and gas operations. There may also be changes to water temperature and chemistry. Habitat can be altered in other ways that negatively impact wildlife. For example, ground nesting birds such as grouse will avoid tall structures.
Accidental spills or intentional dumping of wastewater can contaminate surface water and cause large-scale harm to wildlife. Numerous incidents of wastewater contamination from pipelines, equipment blowouts, and trucks accidents have been reported, and have resulted in kills of fish, aquatic invertebrates, and trees and shrubs, as well as negative health effects for wildlife and domestic animals. For example, a company recently admitted to dumping wastewater from hydraulic fracturing operations into the Acorn Fork Creek in Kentucky, causing a massive fish kill. Among the species harmed was the blackside dace, a threatened minnow species. The discharge of fracking wastewater into the Susquehanna River in Pennsylvania is suspected to be the cause of fish abnormalities, including high rates of spots, lesions, and intersex. In West Virginia, the permitted application of hydrofracturing fluid to an area of mixed hardwood forest caused extensive tree mortality and a 50-fold increase in surface soil concentrations of sodium and chloride.
In addition, open air pits that store waste fluid pose risks for wildlife that may come into contact with the chemicals stored in the pits. Already, there have been several documented cases of animal mortality resulting from contact with pits. A field inspection of open pits in Wyoming found 269 bird carcasses, the likely cause of death being exposure to toxic chemicals stored in the open pits. Open pits can also serve as breeding grounds for mosquitoes, which serve as a vector for West Nile virus, a threat to humans and animals alike. In Wyoming, an increase of ponds led to an increase of West Nile virus among greater sage-grouse populations.

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Invasive species that be introduced through a variety of pathways that would be increasingly common if oil and gas activity is allowed to expand on public lands. Machinery, equipment, and trucks moved from site to site can carry invasive plant species to new areas. In addition, materials such as crushed stone or gravel transported to the site from other locations may serve as a conduit for invasive species to migrate to the well site or other areas en route.
Anthropogenic climate change poses a significant threat to biodiversity. Climate disruption is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extinctions. Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to significantly increase extinction risk for many species. The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999. Other studies have predicted similarly severe losses: 15%-37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario; the extinction of 10% to 14% of species by 2100 if climate change continues unabated; and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species. Because expansion of oil and gas production into California's federal lands will substantially increase the emissions of greenhouse gases, this activity will further contribute to the harms from climate change to wildlife and ecosystems.
Oil and gas development has been linked to population-level impacts on wildlife, including lower reproductive success of sage grouse and declines in the abundance of songbirds and aquatic species. For example, young greater-sage grouse avoided mating near infrastructure of natural-gas fields, and those that were reared near infrastructure had lower annual survival rates and were less successful at establishing breeding territories compared to those reared away from infrastructure. In Wyoming, an increasing density of wells was associated with decreased numbers of Brewer's sparrows, sage sparrows, and vesper sparrows. In the Fayetteville Shale of central Arkansas, the proportional abundance of sensitive aquatic taxa, including darters, was negatively correlated with gas well density.
The BLM should conduct a full assessment of the direct and indirect impacts of oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.
The alternatives considered in the EIS must include at a minimum, cancellation of the 2011 and 2012 Hollister Field Office lease sales subject to litigation, and, more broadly, a prohibition on all oil and gas activities in areas managed by the Hollister Field Office as well as a prohibition on all unconventional oil and gas activities in areas managed by the Hollister Field Office. A prohibition on all oil and gas activities is the only option that will completely eliminate the risk of several of the harms described above. Revisions to the Hollister office's RMP should be implemented after a full consideration of the EIS and Statewide Study in order to protect people, wildlife, and our public lands from the many risks and damages of oil and gas extraction.
The project area may contain numerous special status species, including Endangered Species Act listed species. Recommendation: - The BLM should engage the US Fish and Wildlife Service and the California Department of Fish and Wildlife as early in the analysis as possible to ensure that this topic is adequately analyzed during the NEPA review. Generally, we suggest the analysis include a summary of the status and trends of analysis area ESA-listed species and potential suitable habitat; disclosure of potential impacts to these resources; and the results of USFWS/CDFW coordination, including any recommended design criteria, monitoring and mitigation requirements.

Table C-8
Issue No. 3: Vegetation and Wildlife

In the 2012 study, "Impacts of Gas Drilling on Human and Animal Health" Bamberger and Oswald found exposure to the chemicals used in hydraulic fracturing to be linked to negative respiratory, gastrointestinal, dermatologic, immunologic, reproductive, and endocrine human and animal health effects.
The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include o Habitat Destruction- Oil and gas development harms plants and animals, including endangered and threatened species. Industrial activity destroys habitat and harms delicate ecosystems where drilling and other oil and gas activity occurs.
Pinnacles National Park The federally endangered California condor has been reintroduced at Pinnacles National Park and along the Big Sur coast. This central California flock of 60 wild condors regularly utilizes public lands managed by the BLM Hollister Field Office. NPS is concerned about potential impacts to the California condor from proposed oil and gas development within the central California flock's range, and also has concerns about potential impacts to water quality and quantity of local aquifers.
From a population low of 22 birds in the mid 1980s, California condors are making a slow but tenuous recovery through captive breeding, intensive wild release program and public education efforts. Today, the total population includes 200 California condors in captivity and 230 in the wild. Reintroduced to their ancestral nesting range at Pinnacles National Park in 2003 and along the Big Sur coast by Ventana Wildlife Society in 1997, the central California flock is made up of 60 condors that use inland and coastal habitats. Pinnacles National Park and Ventana Wildlife Society biologists monitor condors on a daily basis and have radio tracked birds on some lands managed by Hollister BLM. NPS is concerned about the potential impacts on the endangered condor that could result from oil and gas leasing and development within the range of the central California flock. Recovery efforts of the federally endangered California condor have benefited directly from ranching and hunting traditions in San Benito and Monterey counties on both private and public lands. Condors regularly utilize livestock troughs as a source of water, forage on carcasses left behind from ranching and hunting operations, and find nesting habitat on public and private open lands.
There are many endangered species within the BLM Central Coast planning area and across federal lands in all of southern CA. The habitat for these listed plants and animals must be mapped and evaluated accurately in the EIS before any leases are anticipated. Public lands are held to a higher standard of protection than is privately owned land.
(3) Unconventional oil and gas production results in large volumes of waste fluid and produced water, byproducts that have contaminated air, water, and soil and harmed humans and wildlife. Under current CA Dept. Of Oil Gas and Geothermal Resources code in California, flowback fluid can be stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water with breaches and spills, and pollute the air through evaporation. Liners tear, and spills and evaporation occur even when the lining remains intact. Wildlife can be killed when exposed to these pits' toxic contents.
Researchers from West Virginia University and the Ohio State University have been awarded a National Science Foundation grant through the Division of Environmental Biology to study the microbial biodiversity found in deep underground shale formations. http://wvutoday.wvu.edu/n/2013/10/30/wvu-ohio-state-researchers-awarded-2-million-for-shale-energy-research
Concerned about: Unknown underground biosphere impacts estimating biology ground level to 5000 feet deep.
The second step of the mitigation hierarchy -- minimization - includes the siting and operation of oil development in a manner that minimizes harm to habitats and species. Critical to achieving minimization of impacts is the identification, development and employment of best management practices (BMPs) that avert or limit site-specific harm to habitats and species. BMPs also specify monitoring and enforcement mechanisms, including adaptive management provisions that require corrective action by lessees, for inclusion in development permits. Adaptive management is the modification of projects based on the results of monitoring actual ecological impacts, as distinct from projected impacts, taking into account variances over time from the ecological conditions that may have been initially presumed to be stable over the projected life of the project. Again,

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Master Leasing Planning could assist the agency in establishing these requirements.
For unavoidable impacts that remain following avoidance and minimization, effective measures must be taken to offset unavoidable negative impacts to affected habitats and species to ensure the viability of species and habitats over time.
Biological Resources. While most well stimulation activity occurs below ground or within the immediate vicinity of the well and well pad, such operations can still dramatically affect surface resources. Biological resources are likely to be subjected to new environmental impacts because advances in well stimulation technology will likely enable exploration and extraction of unconventional oil and gas resources that heretofore have not been exploited in areas that historically have not seen this industry. The potential impacts to these resources stems from the well stimulation treatments themselves, the disposal of waste water from such activity, the transport of materials to and from the well site, the drilling of new wells, and construction of roads, pipelines and other associated infrastructure. The EIS should analyze both the direct and indirect land use impacts of expanded (conventional and unconventional) oil and gas development on biological resources. In particular, the EIS should: - Identify the presence and habitat of sensitive, rare, and threatened, and endangered species under the Endangered Species Act, including rare and listed plant species and Species of Concern identified by the Bureau of Land Management, within BLM-managed lands and resources overlying or including the Monterey Shale formation as well as other conventional and unconventional plays, and assess the likelihood that these resources would be affected by oil and gas field development, including but not limited to impacts from habitat loss, fragmentation, sedimentation in freshwater and marine systems, and water use (e.g., withdrawal of groundwater). - Identify wildlife corridors within areas likely to see oil and gas development and assess impacts to these corridors. - Examine potential impacts on USFWS recovery plans
Oil and gas development on federal lands within the condor's range poses a significant risk to the continued recovery of the California Condor. This risk stems from possible contamination of surface water supplies, including springs, creeks and livestock water troughs, created by leaks and blowouts associated with oil and gas development. Condors not only drink from these surface water sources but are also at risk of consuming contaminated carrion.
The current Citadel Project Indian, taking place on private land six to eight miles from the Pinnacles National Park is an example of a threat to the condors. This project involves thermal stimulation with high pressure steam at a depth of three to six hundred feet. This is very close to the surface and in an area known for earthquakes and faults. A blowout occuring during stimulation could discharge water contaminated with oil and chemicals to the surface and pose a risk to animals and to the condors themselves.
Given the dangers posed to the condors and other endangered species by oil and gas development on public lands a ban on all well stimulation operatoins should be instituted.
Lease revenues from oil and gas development collected by the Bureau of Land Management might pale in comparison to the revenues lost from tourist that stay away. The danger to the continued survival of the endangered California Condor presented by oil and gas development on lands within the jurisdiction of the Hollister Field Office is undeniable. A ban on all well stimulation technologies and all new drilling within the jurisdiction of the Hollister Field Office should be instituted and maintained.

Table C-9
Issue No. 4: Air Quality

On May 31, 2013, the US District Court for the Northern District of California ruled in Center for Biological Diversity v. Bureau of Land Management that BLM violated the National Environmental Policy Act3 ("NEPA") in issuing oil and gas leases without first analyzing the full extent of extreme extraction techniques such as hydraulic fracturing. Where such activity has occurred in other states, the environmental impact has been considerable. Water, air, soil, wildlife, and the climate have all been harmed by the expansion of unconventional extraction methods.
Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.
So-called "closed loop" systems, which store flowback in tanks, still have potential environmental impacts. Even with reduced emission completions, spills and fugitive emissions can still cause soil, water, and air contamination. Using tanks does not obviate the need for trucks and pipes to transport flowback and waste water fluid to offsite disposal facilities. As mentioned above, increased truck traffic also has deleterious effects on the environment through increased traffic, air emissions, and spills.
In addition, the EIS and Statewide Study should assess the impact of refining and burning the newly accessible supply of oil and gas. Allowing unconventional oil and gas recovery would increase need for refineries as well as the total amount of oil and gas available for consumption. The US Energy Information Administration ("EIA") estimates that the Monterey Shale contains over 15 billion gallons of oil. End-users who burn this oil will be polluting the air with many different air pollutants, not the least of which is carbon dioxide, the leading contributor to global warming. The EIS and Statewide Study will be incomplete without assessing the effects of harmful air emissions from burning the fuel that would otherwise remain underground. In particular, the amount of carbon dioxide emitted as a result of oil and gas produced through unconventional extraction methods will lead us further toward irreversible and catastrophic climate change. Oil and gas extraction also emits a substantial amount of methane, a powerful greenhouse gas that will contribute significantly to the climate warming footprint of oil and gas activity.
The EIS and Statewide Study should fully examine the detrimental impact that unconventional well stimulation techniques have on local and regional air quality. Allowing hydraulic fracturing and other techniques on federal lands will greatly increase the release of harmful air emissions. California is already home to many of the nation's worst air quality regions. Thus, the EIS and Statewide Study should consider how increased emissions will exacerbate poor air quality in the state. Though projects must comply with federal Clean Air Act regulations, oil and gas production activity can lead to harmful air quality impacts even when in compliance. Thus, it is essential to look beyond compliance with federal regulations.
The EIS and Statewide Study should assess air emissions from all stages of unconventional oil and gas recovery, including drilling, completion, well stimulation, production, and disposal.
Drilling and casing the wellbore require substantial power from large equipment. In other states, the engines typically run on diesel fuel, which emits particularly harmful types of air pollutants when burned. Similarly, high-powered pump engines are used in the fracturing and completion phase. This too can amount in large volumes of air pollution.
Flaring, venting, and fugitive emissions of gas are also a potential source of air emissions. Gas flaring and venting can occur in both oil and gas recovery processes when underground gas rises to the surface and is not captured as part of production. Fugitive emissions can occur at every stage of extraction and production, often leading to high volumes of gas being released into the air.
Evaporation from open pits can also contribute to air pollution. Open pits that store waste fluid are exposed to the open air. Chemicals mixed with the wastewater can escape into the air through evaporation. Some pits are equipped with pumps that spray effluents into the air to hasten the evaporation process. Even where waste fluid is stored in so-called "closed loop" storage tanks, fugitive emissions can escape from tanks.
As mentioned above, increased truck traffic will lead to more air emissions. Trucks capable of transporting large volumes of chemicals and waste fluid typically use large engines that run on diesel fuel. Air pollutants from truck engines will be emitted not only at the well site, but also along truck routes to and from the site.

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As a result of drilling, well stimulation or completion, production of a well, open pits, truck traffic, flaring and venting, and fugitive emissions, the emission of several air pollutants will undoubtedly increase, further harming California's already poor air quality.
EPA has identified six "criteria" air pollutants that must be regulated under the National Ambient Air Quality Standards (NAAQS) due to their potential to cause primary and secondary health effects. Concentrations of these pollutants- ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead- will likely increase in regions where federal land is opened up to unconventional oil and gas recovery techniques.
Volatile organic compounds, though not listed as a criteria pollutant, can form ground- level (tropospheric) ozone when combined with nitrogen oxides and sunlight. This reaction can diminish visibility and air quality. VOCs can be emitted from car and truck engines as well as the drilling and completion stages of oil and gas production. Tropospheric ozone can also be caused by methane as it interacts with nitrogen oxides and sunlight. Methane is leaked and vented at various stages of unconventional oil and gas development.
In addition, recent reporting requirements implemented by the South Coast Air Quality Management District (SCAQMD) have shown that at least a dozen chemicals known to be air toxics have been used in hydraulic fracturing and other types of unconventional oil and gas recovery in California. Though the reporting requirements are relatively new, already operators have been forced to disclose the fact that they have been using several types of air toxics in California, including crystalline silica, methanol, hydrochloric acid, hydrofluoric acid, 2- butoxyethanol, ethyl glycol monobutyl ether, xylene, amorphous silica fume, aluminum oxide, acrylic polymer, acetophenone, and ethylbenzene. The EIS and Statewide Study should examine whether and to what extent these and other listed air toxics will be released into the air.
Many of these chemicals also appear on the US EPA's list of hazardous air pollutants. A study by the US House of Representatives' on chemicals used in hydraulic fracturing showed twenty-five chemicals regulated as hazardous air pollutants were used in hydraulic fracturing in various states across the country.
SCAQMD's list of air toxics refers to all chemicals included in California Health and Safety Code 44321, which include toxic air contaminants and federal hazardous air pollutants. The EIS and Statewide Study should study the potential harm from all the chemicals included in Section 44321 and any other pollutants that may pose a risk to human health.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Nitrogen oxides (NOx) react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. NOx and volatile organic compounds react in the presence of heat and sunlight to form ozone.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Particulate matter (PM) - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, increased mortality, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Sulfur Dioxide (SO2) - has been shown to cause an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations

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including children, the elderly, and asthmatics.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Carbon Monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death. Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.
The potential harm resulting from increased exposure to the dangerous air pollutants described above far serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the US EPA's website: Ozone (O3) can trigger or worsen asthma and other respiratory ailments. Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Ozone may also lead to loss of species diversity and changes to habitat quality, water cycles, and nutrient cycles.
Air toxics and hazardous air pollutants, by definition, can result in harm to human health and safety. The full extent of the health effects of exposure is still far from being complete, but already there are numerous studies that have found these chemicals to have serious health consequences for humans exposed to even minimal amounts. The range of illnesses that can result are summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses. Other studies and reports have confirmed the pervasive and extensive amount of chemicals that have the potential to cause health risks by being emitted into the air.
BLM should use air modeling to understand what areas and communities will most likely be affected by air pollution. Wind and weather patterns will determine which direction most air pollution will disperse and at what rate. An EIS and Statewide Study should be informed by air modeling to show where the air pollution will flow.
The BLM should conduct a full assessment of the direct and indirect impacts of oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.
The potential expansion of oil and gas drilling, through the process of hydraulic fracturing, to BLM- administered lands in the Hollister Field Office, could have profound effects on regional air quality. The Hollister planning area contains two Federal Class I Areas, the Ventana Wilderness and the Pinnacles National Monument. The EPA believes that disclosing and analyzing the anticipated emissions, from a variety of project activities related to oil and gas drilling, will be necessary to protect these areas. Examples of these activities and their anticipated emission types are particulate matter from surface disturbing activities and from truck traffic and other road travel; combustion emissions from oil and gas well drilling, and operation of other stationary, mobile and non-road engines including those needed to produce and develop oil and gas, etc.; and fugitive emissions of volatile organic compounds from oil and gas well development and production.
Recommendations: - The DEIS should disclose the current air quality conditions in the Hollister planning area, as well as potential air quality impacts associated with oil and gas development activities to be addressed the DEIS.

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The DEIS should evaluate the direct, indirect, and cumulative impacts of oil and gas leasing on: each of the criteria pollutants (i.e., ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead) and attainment or maintenance of their appropriate National Ambient Air Quality Standards; prevention of Significant Deterioration increment consumption at Class I Areas; projected ambient concentrations of hazardous air pollutants (e.g., formaldehyde, benzene, toluene, ethyl benzene, xylene, n-hexane, etc.); and Air Quality Related Values in Class I areas and sensitive Class II areas (e.g., visibility, deposition).

Air Quality MOU for Oil and Gas Decisions on Federal Lands

On June 23,2011, the US Department ofthe Interior, the US Department of Agriculture and the EPA signed a Memorandum of Understanding that established a common process for the agencies to follow in analyzing the potential air quality impacts of proposed oil and gas activities on federally managed public lands. The EPA has begun to use this helpful tool to ensure effective and efficient NEPA air quality evaluations for federal oil and gas decisions. We are eager to work with the BLM using this tool, and believe it works best to convene a technical workgroup composed of the MOU signatory agencies who will participate in this BLM action. The EPA is committed to working productively with our federal partners on this effort.

In accordance with the MOU, an early step that serves to focus the NEPA analysis is the completion of a well conceived and accurate reasonably foreseeable development scenario, which includes at least the reasonably likely number of oil and gas wells or ancillary operations. With the RFD scenario, an emissions inventory of criteria pollutants, volatile organic compounds and hazardous air pollutants can then be prepared. Based upon this emissions inventory, it will be possible to determine whether quantitative modeling needs to be conducted to assess impacts to air quality and/or Air Quality Related Values. This decision can be informed by the National Air Quality MOU, which specifies that modeling is necessary if the proposed action meets specific criteria for level of emissions/impacts as well as geographic location (outlined in section V.E.3. of the MOU). If the BLM concludes that modeling is not required, the DEIS should document the decision not to model and include a qualitative narrative analysis of the impacts to air quality and AQRVs. We would like to collaborate with you early in this decision-making effort to develop an agreeable approach regarding modeling.

If an RFD is included, the DEIS should include an emissions inventory of criteria pollutants, volatile organic compounds and hazardous air pollutants. Based upon this emissions inventory, and following the requirements of the MOU, determine whether quantitative modeling needs to be conducted to assess impacts to air quality and/or AQRVs. The DEIS should include the modeling result or document the decision not to model and include a qualitative narrative analysis of the impacts to air quality and AQRVs.

The BLM should, in collaboration with other affected agencies, identify reasonable mitigation and control measures and design features to address potential adverse impacts to air quality or AQRVs on affected lands in the NEPA process. As articulated in the MOU, this includes evaluating the mitigation measures and determining which ones would need to be employed to eliminate or reduce adverse impacts to air quality and AQRVs.

The DEIS should describe the selected methods for protecting air quality (which can include emission standards or limitations, best management practices, control technologies, and considerations of the pace of development) and the regulatory mechanisms the BLM will use to ensure their implementation (including lease stipulations and conditions of approval, notices to lessees, and permit terms and conditions). We look forward to participating in the technical workgroup to help identify reasonable mitigation measures once more is known about potential future mineral development.

Mitigation for Air Emissions Impacts

The EPA recommends that the DEIS include plans for addressing dust control for oil and gas development. We suggest the plan include, but not be limited to: dust suppression methods and the level of required or anticipated control, inspection schedules, and documentation and accountability processes. The EPA recommends consideration of the following measures to reduce emissions of criteria air pollutants, hazardous air pollutants (air toxics) and fugitive dust.

Construction Emissions Mitigation Plan- The DEIS should include a draft Construction Emissions Mitigation Plan and ultimately adopt this plan in the Record of Decision. In addition to all applicable local, state, or federal requirements, we recommend the following control measures be included in the Construction Emissions Mitigation Plan in order to reduce impacts associated with emissions of particulate matter and other toxics from construction-related activities:

o Fugitive Dust Source Controls: The DEIS should identify the need for a Fugitive Dust Control Plan to reduce PM10 and PM2.s during construction and operations. We

recommend that the plan include these general commitments:

- Stabilize heavily used unpaved construction roads with a non-toxic soil stabilizer or soil weighting agent that will not result in loss of vegetation, or increase other environmental impacts.

- During grading, use water, as necessary, on disturbed areas in construction sites to control visible plumes.

- Vehicle Speed

- Limit speeds to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

- Limit speeds to 10 miles per hour or less on unpaved areas within construction sites on un-stabilized (and unpaved) roads.

- Post visible speed limit signs at construction site entrances.

- Inspect and wash construction equipment vehicle tires, as necessary, so they are free of dirt before entering paved roadways, if applicable.

- Provide gravel ramps of at least 20 feet in length at tire washing/cleaning stations, and ensure construction vehicles exit construction sites through treated entrance roadways, unless an alternative route has been approved by appropriate lead agencies, if applicable.

- Use sandbags or equivalent effective measures to prevent run-off to roadways in construction areas adjacent to paved roadways. Ensure consistency with the project's Storm Water Pollution Prevention Plan, if such a plan is required for the project.

- Sweep the first 500 feet of paved roads exiting construction sites, other unpaved roads en route from the construction site, or construction staging areas whenever dirt or runoff from construction activity is visible on paved roads, or at least twice daily (less during periods of precipitation).

- Stabilize disturbed soils (after active construction activities are completed) with a non-toxic soil stabilizer, soil weighting agent, or other approved soil stabilizing method.

- Cover or treat soil storage piles with appropriate dust suppressant compounds and disturbed areas that remain inactive for longer than 10 days. Provide vehicles (used to transport solid bulk material on public roadways and that have potential to cause visible emissions) with covers. Alternatively, sufficiently wet and load materials onto the trucks in a manner to provide at least one foot of freeboard.

- Use wind erosion control techniques (such as windbreaks, water, dust suppressants, and/or vegetation) where soils are disturbed in construction, access and maintenance routes, and materials stock pile areas. Keep related windbreaks in place until the soil is stabilized or permanently covered with vegetation.

Mobile and Stationary Source Controls:

- If practicable, lease new, clean equipment meeting the most stringent of applicable Federal or State Standards. In general, commit to the best available emissions control technology. Tier 4 engines should be used for project construction equipment to the maximum extent feasible.

- Where Tier 4 engines are not available, use construction diesel engines with a rating of 50 hp or higher that meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, unless such engines are not available.

- Where Tier 3 engine is not available for off-road equipment larger than 100 hp, use a Tier 2 engine, or an engine equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides and diesel particulate matter to no more than Tier 2 levels.

- Consider using electric vehicles, natural gas, biodiesel, or other alternative fuels during construction and operation phases to reduce the project's criteria and greenhouse gas emissions.

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- Plan construction scheduling to minimize vehicle trips. - Limit idling of heavy equipment to less than 5 minutes and verify through unscheduled inspections. - Maintain and tune engines per manufacturer's specifications to perform at CARB and/or EPA certification levels, prevent tampering, and conduct unscheduled inspections to ensure these measures are followed.
Include provisions for monitoring fugitive dust in the fugitive dust control plan and initiate increased mitigation measures to abate any visible dust plumes.
In addition to regulatory required fugitive dust controls, the Applicant should: - Avoid areas that may harbor the fungus if practicable. - Restrict high risk workers from contaminated areas if possible. - Test soils to be disturbed for presence of the cocci fungus, understanding that even in known endemic areas, the distribution of the fungus in the soil is sporadic and very limited. - Require that grading and construction equipment cabs be enclosed, HEPA ventilated, and air-conditioned. - Use personal protective equipment in dusty work areas: o Disposable clothing. o Method to clean work boots at the end of the shift. o NIOSH certified N95 respirator, at a minimum or one with a higher protection factor. - Provide personal hygiene (washing) facilities. - Require crews to work upwind from excavation sites. - Pave construction roads. - Minimize ground disturbance as much as possible. Revegetate temporarily disturbed areas promptly. - Discourage workers from carrying any fomites home with them. Institute hygiene measures to limit dust transport offsite. - Consider limiting visitor site access without proper training or personal protective equipment. - Prohibit work activities when wind speeds exceed 25 mph. - Consider mitigation measures that would provide advanced notification to sensitive receptors of the potential effects of a Coccidioides infection. - Contact the local or state public health agency to better understand the incidence of Coccidioidomycosis in the project area and surrounding region. Provide local public health officials with a schedule of project activities that disturb soil. Ensure local physicians consider Coccidioidomycosis in diagnoses involving flu or flu-like symptoms.
Oil and gas drilling also results in impacts on air quality which could have consequences for human health. In a study titled Human health risk assessment of air emissions from development of unconventional natural gas resources (McKenzie et al 2012) found that it is likely that oil and gas drilling operations emit petroleum hydrocarbons and VOCs, the inhalation of which is linked to irritation of the eyes, nose, and throat, breathing difficulties, cancer, childhood leukemia, blood disorders, and nervous system impairment.

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The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include Air , Water, and Soil Contamination - Oil and gas development release a number pollutants that degrade the quality of our air, water, and soil.
The EIS should study all environmental impacts made more severe by fracking and other types of unconventional oil and gas extraction. These include: o Air, Water, and Soil Contamination: Fracking uses hundreds of chemicals that are known to have adverse human health impacts. Numerous instances of contamination have been reported in places where fracking has occurred. The EIS must include an analysis of adverse human health impacts from all of the chemicals used in the fracking process, as well as from those chemicals used in other types of unconventional oil and gas extraction techniques.
Air Quality and Greenhouse Gas Emissions: The County requests that local and cumulative impacts to air quality be analyzed in the EIS.
Third, with respect to greenhouse gases ("GHGs") and climate change, the Industry Associations urge BLM to avoid taking an unduly broad approach toward assessing GHG emissions associated with oil and gas development. In particular, the emissions associated with the ultimate combustion of refined oil products within the energy sector are completely beyond the scope of what is required by NEPA. Such emissions have nothing to do with the process by which oil reserves are developed or with a resource management plan that provides broad guidelines for such development. CEQ has recognized the difficulty in assessing climate change impacts associated with broad resource management actions such as this and proposed to exclude those projects from its climate change guidance. See CEQ, Draft Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions 2 (Feb. 18, 2010) ("CEQ" does not propose to make this guidance applicable to Federal land and resource management actions . . . .").
· If BLM decides to address GHG emissions and climate change in its NEPA analysis, the analysis should be limited to direct emissions associated with the combination of hydraulic fracturing and horizontal drilling on lands overseen by the Hollister Field Office. Because oil is an essentially fungible product, it would not be relevant to consider downstream emissions associated with oil combustion as those emissions would have occurred anyway though the combustion of oil drawn from competing sources. Thus, such emissions should be excluded from the NEPA analysis as insignificant because they would occur regardless of the source of oil used. Furthermore, conducting a complete lifecycle analysis of the emissions associated with shale oil would entail engaging in comparisons with competing sources; such an undertaking would require significant Bureau resources beyond the BLM's scope of expertise and would not be commensurate with the narrow scope of BLM's assessment that is appropriate in this context. BLM should also acknowledge that GHG emissions will be co-controlled by the existing Clean Air Act requirements cited above.
BLM land should be closed, in particular to oil and gas development that involves hydraulic fracturing. There are too many unknowns about the impacts of hydraulic fracturing at this point for the BLM to properly analyze the impacts of fracking in the EIS. New studies have been released as recently as December 2013 (such as Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and GroundWater in a Drilling-Dense Region Kassotis et al. 2013) on the negative impacts hydraulic fracturing has on public health and safety and on water and air quality.
Oil and gas drilling also results in impacts on air quality that could be harmful to human health. A study by McKenzie et al 2012 called Human health risk assessment of air emissions from development of unconventional natural gas resources found that it is likely that the pollutants emitted in oil and gas drilling operations cause eyes, nose and throat irritation as well as respiratory issues. These pollutants could also lead to cancer and leukemia.
Due to the negative impacts to surface water and groundwater, to air quality, and to human health through exposure to endocrine disruptors and other chemicals present in fracking fluids, it will be impossible for the BLM to reach these RMP objectives while using hydraulic fracturing as an oil and gas extraction method.
California suffers from some of the worst air pollution in the country. Facilities classified as sensitive receptors, such as schools and residences, are found throughout rural areas where public lands are located. These areas will be exposed to high levels of exhaust and emissions from construction and operations, adversely impacting public health and air quality. Cumulative contributions of emissions that will reduce air quality must be properly evaluated to ensure that public health is protected, and determine whether proposed O&G development will conflict with implementation of plans for air quality attainment under applicable state and federal laws.
If oil and gas activities proposed under the Hollister RMP may result in increased air emissions, the EIS may need to evaluate the impacts to air quality and air quality related

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values (AQRVs) in NPS Class I and sensitive Class II areas, as outlined in an Air Quality Memorandum of Understanding (MOU) among the US Department of Agriculture, US Department of the Interior and the US Environmental Protection Agency1. The air quality MOU provides a consistent approach to analyzing air quality and AQRV impacts in NEPA documents for federal oil and gas decisions. It also outlines the expectations for collaboration among the five signatory agencies. We request the opportunity to work with the BLM on the air quality analysis should the air quality MOU apply to the Hollister Field Office RMP Revision.

Assessing potential air quality and AQRV impacts at the RMP phase is imperative, as it establishes the desired conditions and goals for air resources, and provides direction for all subsequent oil and gas leasing and permitting decisions, including identifying necessary mitigation measures, as stipulations or conditions of approval, to ensureadequate resource protection into the future. The NPS believes that the RMP is the most appropriate stage in the planning process to ensure that cumulative air quality mitigation is consistently employed across the field office and region for both leased and un-leased areas. This is consistent with BLM policy outlined in the BLM Land Use Planning Handbook H-1601-1 (Appendix C, Part H, Fluid Minerals: Oil and Gas, Tar Sands, and Geothermal Resources), which lists the land use planning decisions for Fluid Minerals that are to be identified in the land use planning document. Among other things, the plan should identify "Whether constraints identified in the land use plan for new leases also apply to areas currently under lease." This approach ensures that mitigation is consistently applied in the field office and regionally through a coordinated planning effort.

For further information, please contact Tonnie Cummings, Air Resources Specialist, National Park Service, Pacific West Region, 612 E. Reserve Street, Vancouver, WA 98661 (360) 816-6201

(8) Air pollution impacts from the evaporation of fracking chemicals, the leaked release or intentional flaring of natural gas, and the machinery and trucking that may run 24 hours a day servicing these well drilling, and production sites must be estimated and included in the EIS.

Concerned about:

Clean air (impact of any atmospheric releases)

In the search for oil, gas and development of federal minerals in the Central Coast, Ohlone/Costanoan- Esselen Nation objects to disturbance using the hydraulic fracturing process. Fracturing can lead to environmental risks, contamination of ground water, depletion of fresh water, contamination of the air. There are increases in earthquake activity associated with the degradation of bedrock.

Methane is a much more potent greenhouse gas than carbon dioxide, and it is released into the air in prodigious amounts in the process of fracking for gas. Recent reports have shown that much more methane is being released at well heads than the industry has claimed - enough to call into question the oft-repeated assertion that natural gas is cleaner than coal.

The EIS must consider these releases as a serious consequence of oil and gas production.

Sources of pollution from oil and gas development include: construction emissions (i.e.-mobile sources, construction off-road equipment) and operational emissions (i.e.-mobile source, stationary sources). The District recommends the air quality emissions associated with well stimulation technologies be identified and quantified to identify the impacts. For CEQA, the District applies the following thresholds of significance for criteria pollutants: 10 tons per year oxides of nitrogen (NOx), 10 tons per year reactive organic gases (ROG), and 15 tons per year particulate matter of 10 microns or less in size (PM10). Emissions from stationary sources and mobile sources should be analyzed separately

Stationary sources would include the equipment associated with the well stimulation technologies (IC engines powering pumps, separators, and flares) and emissions associated with handling of well stimulation fluids and fluids during back after well stimulation.

Mobile sources include vehicular emissions associated with any potential truck deliveries or hauling, employee transportation in preparation for well stimulation technologies, and de-mobilization after well stimulation technologies are completed.

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When assessing the significance of well stimulation technology projects on air quality, it should be noted that the impacts from operational activities may be significant. Under such circumstances, the District recommends that an ambient air quality analysis be performed for all pollutants.

For air quality impacts determined to be significant, the District recommends feasible mitigation through a Voluntary Emission Reduction Agreement (VERA).

A VERA is a mitigation measure by which a project proponent provides pound- for-pound mitigation of emissions increases through a process that develops, funds, and implements emission reduction projects, with the District serving a role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds to the District. The funds are disbursed in the form of grants for projects that achieve emission reductions. Thus, the project specific impacts on air quality can be fully mitigated. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors.

In implementing a VERA, the District verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission reduction projects, and ensures the enforceability of achieved reductions. The initial agreement is generally based on the projected maximum emissions increases as calculated by the District approve air quality impact assessment, and contains the corresponding maximum fiscal obligation. However, because the goal is to mitigate actual emissions, the District has designed flexibility into the VERA such that the final mitigation is based on actual emissions related to the project as determined by actual equipment used, hours of operation, etc., and as calculated by the District. After the project is mitigated, the District certifies to the lead agency that the mitigation is completed, providing the lead agency with an enforceable mitigation measure demonstrating that project specific emission have been mitigated to less than significant.

The District has been developing and implementing VERA contracts with project developers to mitigate project specific emissions since 2005. It is the District's experience that implementation of a VERA is a feasible mitigation measure, and effectively achieves the emission reductions required by a lead agency, by mitigated project related impacts on air quality by supplying real and contemporaneous emission reductions.

Nuisance Odors: The project should be evaluated to determine the likelihood that the project would result in nuisance odors. Nuisance orders are subjective, thus the District has not established thresholds of significance for nuisance odors. Nuisance odors may be assessed qualitatively taking into consideration of project design elements and proximity to off-site receptors that potentially would be exposed objectionable odors.

Health Impacts: TAGs are defined as air pollutants that which may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health. The most common source of TAGs can be attributed to diesel exhaust fumes that are emitted from both stationary and mobile sources. Health impacts may require a detailed health risk assessment (HRA). Project related health impacts should be evaluated to determine if emissions of toxic air contaminants (TAG) will pose a significant health risk to nearby sensitive receptors.

More information on TAGs, prioritizations and HRAs can be obtained by:

E-mailing inquiries to: hramodeler@valleyair.org; or

Visiting the District's website at:

http://www. valleyair.org/busind/ptofTox_Resources/AirQualityMonitoring.htm.

In addition to the discussions on potential impacts identified above, the District recommends the EIS also include the following discussions:

a) A discussion of the methodology, model assumptions, inputs and results used in characterizing the project's impact on air quality. To comply with National Environmental Policy Act (NEPA) requirements, the District recommends that the modeling outputs be provided as appendices to the EIS. The District further recommends, that the District be provided with an electronic copy of all input and output files for all modeling

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In addition to the discussions on potential impacts identified above, the District recommends the EIS also include the following discussions:
A discussion of project design elements and mitigation measures, including characterization of the effectiveness of each mitigation measure incorporated into the project.
Some equipment used in well stimulation activities may be subject to District Permits/Portable Equipment Registration and/or California Air Resources Board (GARB) portable equipment registration. District Regulation VIII Fugitive PM10 Prohibitions may apply to unpaved roadways, construction activities in support of well stimulation technologies.
I do not want fracking ANYWHERE In California. It is far, far from green, releasing thousands of unknown chemicals and METHANE, which is the strongest of the air pollutants released by these monstrosities.
Further require drillers to place reserves to cover any potential environmental damage that may arise from their activities over time eg 20 yrs or more. Too easy to be sloppy when they can just drill and leave. All pollution related to drilling and production should be avoided or fully mitigated. That includes leaking gas. Require all new supply of the product (natural gas and oil) not to be burned as that is adding to global warming and other pollutants. One alternative, use in fuel cells which do not burn but use chemical reactions and are zero emission. Oil for lubrication, plastics, drugs and other non burn uses.
Before they were pulled, the scientific studies by the EPA were indicating that fracking was dangerous and had longterm effects on both land, water and the air quality.

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Climate Change – Adaptation
BLM land in all California Field Offices should be closed to further oil and gas development and future oil and gas leasing, especially in regard to hydraulic fracturing. Lots of research to support this, but the biggest is we are in a drought and fracking costs millions of gallons of water that is unusable. That polluted water is sent back beneath the water table but it is possible for it to leach into local water supplies.
The EIS must consider not just the current effects of global warming, but also the future effects if more fossil fuels are produced and burned, releasing more carbon into the atmosphere. For example, severe weather will become more severe, more ecosystems will crash, and more species will become extinct, to name just some of what we can expect. Scientists warn of a "mass extinction event," the sixth in the history of the earth, paralleling the one that killed off the dinosaurs and other large reptiles. They also postulate an abrupt and irreversible shift in the global ecosystem, "a planetary-scale critical transition as a result of human influence," principally global warming ["Approaching a state shift in Earth's biosphere," Nature, June 7, 2012]. It is important for the EIS to take these matters seriously. It should not diminish the contribution that oil and gas extracted from BLM-controlled land would make to climate change - by claiming, for example, that production from BLM sources would not be "significant" compared to worldwide production. It is all significant. Production from BLM sources would: - Directly increase global warming by adding carbon to the atmosphere. Every bit of fossil fuel that's extracted from the earth and burned contributes to climate change. - Indirectly increase global warming by adding to the supply and availability of carbon-based fuels, thus lowering their cost. That will make sustainable (non-carbon) energy sources relatively more expensive, slowing their adoption and prolonging the unsustainable use of fossil fuels. - Give an excuse to others, who can adopt the same logic and say, "Look, they're producing oil and gas over there on BLM-managed land (and in North Dakota, Pennsylvania, the Gulf of Mexico, the Arctic Ocean, etc.). What we would produce over here is just a drop in the bucket compared to that, so it won't matter." That conformist logic is a path to ecocide and an unlivable planet. It all matters, every drop. To pretend otherwise would be intellectually dishonest and, frankly, a cop-out.
When it comes to water, well stimulation is a double whammy: On the front end, water is consumed and turned into toxic waste. On the back end, when the oil and gas is burned, it will add more carbon to the atmosphere and contribute to global warming. Among other things, that will further intensify extreme weather events, like our current drought, restricting our supply of water still more.
You will likely hear an argument that opening more areas to oil and gas drilling will create jobs and spur economic growth, and that any environmental considerations must be balanced against these economic imperatives. But what kind of jobs? No matter how much it pays, a job cannot be said to be "good" if it contributes to the kind of world-changing destruction we face with climate change. And what kind of economy? An economy based on carbon fuels will necessarily flounder. I believe it was David Brower who observed that the economy is a wholly owned subsidiary of the ecology. As the global environment deteriorates due to climate change, we humans will find it more and more difficult to sustain ourselves (as fisheries go belly up, forests die, agriculture becomes impossible in many areas and more difficult and tenuous in others, etc.). At the same time, we will, at minimum, be buffeted by violent storms, droughts, floods, rising seas levels, and prolonged periods of extreme temperatures. Who can imagine a robust growing economy in such circumstances? We, and all our endeavors, are irrevocably tied to the natural world. As we destroy that world, we too will suffer the consequences. There are times when balancing competing interests is appropriate, and times when it is not. It is not appropriate when facing an existential crisis, as we are now.
As a member of 350.org, I'm deeply concerned about the environmental impacts of fossil fuels, including climate change and global warming. To keep our planet habitable, we must leave some of the known oil reserves in the ground. Calculations have been done to show that developing all of the known oil reserves will releases so much carbon dioxide that it basically amounts to committing collective suicide, five times over.

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The Bureau of Land Management should be conserving open space. It's a natural watershed that enables sustainability for the aquifers and groundwater. It provides for our basic needs and that of the environment that all life is dependent upon. As we are experiencing a devastating water shortage and severe climate change, the decision to be made by the HFO is new areas need to be closed to oil and gas drilling and no new permits issued on current leases.
Approval of fracking Monterey shale oil on BLM land will impact not only our health and local diversity but, continued federal subsidy and development of carbon generating fossil fuels will push us further towards the larger climate change question of whether or not there will be future generations.
It doesn't take a EI statement to understand that California cannot tolerate fracking. The ongoing drought and persistent year-round forest fires make it extremely dangerous, to say nothing of the farming industry. You do realize, don't you, that this state feeds well over half the country.
Fracking should not be allowed in seismically active California. The full consequences of fracking to precious groundwater resources and the potential effects of fracking on land subsidence and sensitive faults has not been studied sufficiently. Much remains unknown. Beyond that concern, fracking will result in even more CO2 being released into an already catastrophically altered climate. Global warming is already manifesting in our lifetimes with loss of glaciers and sea ice, erratic and destructive weather, and other rapid changes to climate that will devastate the environment, human communities, and the world's economy. Fracking, in that respect, threatens the security of the United States.
Climate Change – Greenhouse gases
In addition, the EIS and Statewide Study should assess the impact of refining and burning the newly accessible supply of oil and gas. Allowing unconventional oil and gas recovery would increase need for refineries as well as the total amount of oil and gas available for consumption. The US Energy Information Administration ("EIA") estimates that the Monterey Shale contains over 15 billion gallons of oil. End-users who burn this oil will be polluting the air with many different air pollutants, not the least of which is carbon dioxide, the leading contributor to global warming. The EIS and Statewide Study will be incomplete without assessing the effects of harmful air emissions from burning the fuel that would otherwise remain underground. In particular, the amount of carbon dioxide emitted as a result of oil and gas produced through unconventional extraction methods will lead us further toward irreversible and catastrophic climate change. Oil and gas extraction also emits a substantial amount of methane, a powerful greenhouse gas that will contribute significantly to the climate warming footprint of oil and gas activity.
Volatile organic compounds, though not listed as a criteria pollutant, can form ground- level (tropospheric) ozone when combined with nitrogen oxides and sunlight. This reaction can diminish visibility and air quality. VOCs can be emitted from car and truck engines as well as the drilling and completion stages of oil and gas production. Tropospheric ozone can also be caused by methane as it interacts with nitrogen oxides and sunlight. Methane is leaked and vented at various stages of unconventional oil and gas development.
The EIS and Statewide Study must fully analyze the impact of unconventional oil and gas extraction on the biggest and most challenging environmental problem of our time: climate change. The first goal listed under NEPA is to "fulfill the responsibilities of each generation as trustee of the environment for succeeding generations." Expansion of oil and gas production into California's federal lands will substantially increase the volume of greenhouse gases emitted into the atmosphere and jeopardize the sustainability of the environment and the health and well being of future generations. In order to avoid catastrophic climate change, BLM should be looking for ways to reduce, rather than increase, greenhouse gas emissions.
BLM should perform a full analysis of all gas emissions that contribute to climate change, including methane and carbon dioxide, two of the most common greenhouse gases. The EIS and Statewide Study should calculate the average amount of greenhouse gas that will result from a single approved well (expressed in global warming potential CO2 equivalent) as well as the estimated cumulative greenhouse gas emissions expected over the long term. Though globally, carbon dioxide is emitted in higher volumes, methane's global warming potential is 72 to 105 times higher than carbon dioxide over a 20-year period. The International Panel on Climate Change recently revised the global warming potential of methane to 84 times that of CO2 over a 20-year period. The oil and gas sector is one of the largest sources of global methane emissions, accounting for approximately 30 percent of US methane emissions, and is expected to be one of the most rapidly growing sources of anthropogenic methane emissions in the coming decades.
BLM must conduct a full lifecycle analysis of the impact of its action, including but not limited to the following sources. End-user oil and gas combustion. The combustion of the extracted oil and gas will add vast amounts of carbon dioxide to the atmosphere, further heating the climate and

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moving the globe closer to catastrophic and irreversible climate change. Though much of the oil is used as gasoline to fuel the transportation sector, the produced oil may be combusted as different types of products. All uses should be included as contributors to climate change.
BLM must conduct a full lifecycle analysis of the impact of its action, including but not limited to the following sources. Emissions from Refineries and Production. Oil and gas must undergo intensive refinery and production processes before the product is ready for consumption. Refineries and their auxiliary activities constitute a significant source of emissions. Moreover, California's oil is largely low-grade crude, making the refinement process even more energy intensive. The state estimated that 70 percent of California's active wells produced extra-heavy or heavy crude. Refining this oil will produce even more greenhouse gases than refining other supplies of oil. The Union of Concerned Scientists projected that California's refineries emit 19 to 33 percent more greenhouse gases per barrel compared to other regions.
BLM must conduct a full lifecycle analysis of the impact of its action, including but not limited to the following sources. Vented emissions. As discussed in Section II.H.1, oil and gas operations frequently vent gas that flows to the surface at times where the gas cannot otherwise be captured and sold. Vented gas can contain methane and escape into the atmosphere.
BLM must conduct a full lifecycle analysis of the impact of its action, including but not limited to the following sources. Combustion during operations. Operators of oil and gas wells rely on both mobile and stationary sources of power to run their sites. The engines on drilling equipment, pumps, trucks, and other types of equipment burn large amounts of fuel to operate. Carbon dioxide, methane, and nitrous oxide (N2O, another potent greenhouse gas) are emitted from oxidized fuel during the combustion process. Engines emit greenhouse gases during all stages of oil and gas recovery, including drilling rig mobilization, site preparation and demobilization, completion rig mobilization and demobilization, well drilling, well completion (including hydraulic fracturing and other unconventional extraction techniques), and well production. Transportation of equipment and chemicals to and from the site are an integral part of the production process and contributes to greenhouse gas emissions. Gas that is flared to dispose of unwanted gas is another type of on-site combustion that is a potential source of carbon dioxide emissions.
BLM must conduct a full lifecycle analysis of the impact of its action, including but not limited to the following sources. Fugitive emissions. Production wells, especially gas wells, can leak potent greenhouse gases through fugitive emissions at many different points in the production process. Some studies show fugitive emissions as high as 7.9 percent.
The harms from continued anthropogenic greenhouse emissions are nothing short of catastrophic. A rise in global average temperature by just a few degrees will likely result in wide range of devastating consequences. To name only a few of the global-scale consequences, climate change may lead to: sea level rise and population displacement, increased frequency of extreme weather events, change in weather patterns, extreme floods and droughts, ocean acidification, mass species extinction, loss of biodiversity, spread of vector-born disease, and reduction of food and water security.
The EIS and Statewide Study cannot ignore the potential for oil and gas development on public lands to contribute to the global warming crisis.
When examining the increased oil and gas production activity's effect on communities disproportionately impacted by climate change, communities far from the drilling need to be considered, communities such as the Native Village of Kivalina in Alaska. The small Inupiaq village north of the Arctic Circle, which will be forced to relocate due to the melting ice pack, and many like it, are feeling the effects of global warming first and worst. Any analysis of the environmental justice impacts of increased oil and gas production must look at the effect of that increased production on climate change, and the corresponding disproportionate effects on environmental justice communities.
Anthropogenic climate change poses a significant threat to biodiversity. Climate disruption is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extinctions. Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to significantly increase extinction risk for many species. The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk

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of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999. Other studies have predicted similarly severe losses: 15%-37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario; the extinction of 10% to 14% of species by 2100 if climate change continues unabated; and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species. Because expansion of oil and gas production into California's federal lands will substantially increase the emissions of greenhouse gases, this activity will further contribute to the harms from climate change to wildlife and ecosystems.
The BLM should conduct a full assessment of the direct and indirect impacts of oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.
The federal Energy Information Agency has estimated that the Monterey Shale formation holds more than 15 billion barrels of oil, or about 6 billion tons of C02. The full exploitation of these oil resources would result in considerable greenhouse gas emissions. Additionally, oil and natural gas systems are one of the largest contributors to anthropogenic methane emissions in the US, according to EPA's 2011 US Greenhouse Gas Inventory Report. Pursuant to the Council on Environmental Quality's "Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions," and Executive Order 13514, the EPA recommends that the BLM include, in the DEIS, an assessment of the projected GHG emissions for this action, a description of how these emissions would impact climate change, and how climate change may affect oil and gas activities in the planning area.
Describe the potential range of GHG emissions that may be associated with lifecycle commercial oil and gas development under each alternative, to help BLM decision makers and the public understand how GHG emissions scenarios may vary. We recommend that GHG emissions be quantified in CO2-equavalent terms and translated into equivalencies that are easily understood from the public standpoint (e.g., annual GHG emissions from x number of motor vehicles, see http://www.epa.gov/cleanenergy/energy-resources/calculator.html). In addition, because information on the "downstream" indirect GHG emissions from activities such as refining may be of interest to the public in obtaining a complete picture of the GHG emissions associated with the proposed project, it may be helpful to estimate and disclose such information.
Describe any existing Regional, Tribal or State climate change plans or goals that cover the oil and gas development area as well as the extent to which the BLM would reconcile, through mitigation or otherwise, its proposed action with such plans.
Qualitatively discuss the link between GHGs and climate change, and the potential impacts of climate change. Include a summary discussion of ongoing and projected regional climate change impacts relevant to the planning area.
Identify any potential impacts from the proposed action that may be exacerbated by climate change (e.g., reclamation could become more difficult with climate change, or the impacts of water consumption could increase). We recommend that the BLM assess and implement measures to reduce GHG emissions associated with the proposed project, including alternatives and/or potential means to mitigate emissions. We recommend considering mitigation measures from the EPA's Natural Gas STAR Program as examples of cost-effective technologies and practices to reduce GHG emissions (www.epa.gov/gasstar/).
Ban all fracking on BLM lands. I could go into greater detail about global climate change but you have already seen the evidence and you know that more than 95% of climate scientists agree that massive changes to reduce CO2 in our atmosphere must take place now to avert a catastrophe.
The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include o Greenhouse Gas Emissions- the development, production, transportation, refinement, and ultimate use of oil and gas will contribute to our climate crisis. Recent studies have

shown that methane- a highly potent greenhouse gas- is leaking from oil and gas activity at a much higher rate than previous estimates.

Third, with respect to greenhouse gases ("GHGs") and climate change, the Industry Associations urge BLM to avoid taking an unduly broad approach toward assessing GHG emissions associated with oil and gas development. In particular, the emissions associated with the ultimate combustion of refined oil products within the energy sector are completely beyond the scope of what is required by NEPA. Such emissions have nothing to do with the process by which oil reserves are developed or with a resource management plan that provides broad guidelines for such development. CEQ has recognized the difficulty in assessing climate change impacts associated with broad resource management actions such as this and proposed to exclude those projects from its climate change guidance. See CEQ, Draft Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions 2 (Feb. 18, 2010) ("CEQ" does not propose to make this guidance applicable to Federal land and resource management actions . . . .").

If BLM decides to address GHG emissions and climate change in its NEPA analysis, the analysis should be limited to direct emissions associated with the combination of hydraulic fracturing and horizontal drilling on lands overseen by the Hollister Field Office. Because oil is an essentially fungible product, it would not be relevant to consider downstream emissions associated with oil combustion as those emissions would have occurred anyway though the combustion of oil drawn from competing sources. Thus, such emissions should be excluded from the NEPA analysis as insignificant because they would occur regardless of the source of oil used. Furthermore, conducting a complete lifecycle analysis of the emissions associated with shale oil would entail engaging in comparisons with competing sources; such an undertaking would require significant Bureau resources beyond the BLM's scope of expertise and would not be commensurate with the narrow scope of BLM's assessment that is appropriate in this context. BLM should also acknowledge that GHG emissions will be co-controlled by the existing Clean Air Act requirements cited above.

(10) Climate Change and global warming are worsened by every gallon of oil or cubic foot of gas that is extracted from the earth. The USA is a nation without a coherent energy policy. The financial investment being put into the recovery of fracked gas and tight oil is a major problem for global climate disruption. If this money were invested instead, into renewable energy development, including wind and solar power, the benefits to the citizens of this country would be immense. Far more jobs would be created and our planet might have a chance to avoid the catastrophic impacts of climate change. Time is running out. The last thing the USA needs now is more oil and gas development. The nation of Spain now generates 21% of its entire national electricity supply from wind power alone. We need to learn from those nations that lead on energy policy.

This BLM EIS must assess the climate impacts of all the oil and gas burned from fuels produced from leases offered by the BLM. Carbon dioxide and leaked and flared methane, as well as the evaporation of fracking chemicals are all part of the negative climatic impacts of oil and gas production. How many tons of carbon dioxide may be produced from the public lands managed by the Hollister BLM Office, and general RMP you state that you are preparing?

Concerned about:

Injection of hazardous chemicals into the biosphere.

The NOI identifies greenhouse gases ("GHG") and climate change as among the preliminary issues to be addressed in the EIS. 78 Fed. Reg. 47409. In considering this issue, the scope of analysis should focus on GHG emissions directly associated with well development, completion and production, consistent with the updated development scenario. Downstream GHG emissions associated with combustion of refined products are driven by demand rather than by the specific source of production and would occur in any case through combustion of products from other sources. As such, under NEPA's analytic "rule of reason", it is in appropriate to extend the analysis beyond the potential addition of new lease stipulations and conditions to the Hollister RMP.

The EIS must consider not just the current effects of global warming, but also the future effects if more fossil fuels are produced and burned, releasing more carbon into the atmosphere. For example, severe weather will become more severe, more ecosystems will crash, and more species

will become extinct, to name just some of what we can expect. Scientists warn of a "mass extinction event," the sixth in the history of the earth, paralleling the one that killed off the dinosaurs and other large reptiles. They also postulate an abrupt and irreversible shift in the global ecosystem, "a planetary-scale critical transition as a result of human influence," principally global warming ["Approaching a state shift in Earth's biosphere," Nature, June 7, 2012].

It is important for the EIS to take these matters seriously. It should not diminish the contribution that oil and gas extracted from BLM-controlled land would make to climate

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change - by claiming, for example, that production from BLM sources would not be "significant" compared to worldwide production. It is all significant. Production from BLM sources would:

- Directly increase global warming by adding carbon to the atmosphere. Every bit of fossil fuel that's extracted from the earth and burned contributes to climate change.

- Indirectly increase global warming by adding to the supply and availability of carbon-based fuels, thus lowering their cost. That will make sustainable (non-carbon) energy sources relatively more expensive, slowing their adoption and prolonging the unsustainable use of fossil fuels.

- Give an excuse to others, who can adopt the same logic and say, "Look, they're producing oil and gas over there on BLM-managed land (and in North Dakota, Pennsylvania, the Gulf of Mexico, the Arctic Ocean, etc.). What we would produce over here is just a drop in the bucket compared to that, so it won't matter."

That conformist logic is a path to ecocide and an unlivable planet. It all matters, every drop. To pretend otherwise would be intellectually dishonest and, frankly, a cop-out.

Finally, President Obama has promised bold action against climate change. Opening up public land to oil and gas development is counterproductive and takes us further down the path towards irreversible climate disruption. The EIS must evaluate all of these additional risks posed by fossil fuel development on public lands, and include prohibiting oil and gas activity on public lands as an alternative management approach.

As a member of 350.org, I'm deeply concerned about the environmental impacts of fossil fuels, including climate change and global warming. To keep our planet habitable, we must leave some of the known oil reserves in the ground. Calculations have been done to show that developing all of the known oil reserves will releases so much carbon dioxide that it basically amounts to committing collective suicide, five times over.

Methane leaks at the well-head posing a great threat to the atmosphere. Polluting our air, leading to climate change.

Sources of pollution from oil and gas development include: construction emissions (i.e.-mobile sources, construction off-road equipment) and operational emissions (i.e.-mobile source, stationary sources). The District recommends the air quality emissions associated with well stimulation technologies be identified and quantified to identify the impacts. For CEQA, the District applies the following thresholds of significance for criteria pollutants: 10 tons per year oxides of nitrogen (NOx), 10 tons per year reactive organic gases (ROG), and 15 tons per year particulate matter of 10 microns or less in size (PM10). Emissions from stationary sources and mobile sources should be analyzed separately

Stationary sources would include the equipment associated with the well stimulation technologies (IC engines powering pumps, separators, and flares) and emissions associated with handling of well stimulation fluids and fluids during back after well stimulation.

Mobile sources include vehicular emissions associated with any potential truck deliveries or hauling, employee transportation in preparation for well stimulation technologies, and de-mobilization after well stimulation technologies are completed.

A VERA is a mitigation measure by which a project proponent provides pound- for-pound mitigation of emissions increases through a process that develops, funds, and implements emission reduction projects, with the District serving a role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds to the District. The funds are disbursed in the form of grants for projects that achieve emission reductions. Thus, the project specific impacts on air quality can be fully mitigated. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors.

In implementing a VERA, the District verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission reduction projects, and ensures the enforceability of achieved reductions. The initial agreement is generally based on the projected maximum emissions increases as calculated by the District approve air quality impact assessment, and contains the corresponding maximum fiscal obligation. However, because the goal is to mitigate actual emissions, the District has designed flexibility into the VERA such that the final mitigation is based on actual emissions related to the project as determined by actual equipment used, hours of

Table C-10
Issue No. 5: Climate Change

operation, etc., and as calculated by the District. After the project is mitigated, the District certifies to the lead agency that the mitigation is completed, providing the lead agency with an enforceable mitigation measure demonstrating that project specific emission have been mitigated to less than significant.
The District has been developing and implementing VERA contracts with project developers to mitigate project specific emissions since 2005. It is the District's experience that implementation of a VERA is a feasible mitigation measure, and effectively achieves the emission reductions required by a lead agency, by mitigated project related impacts on air quality by supplying real and contemporaneous emission reductions.
In addition to the discussions on potential impacts identified above, the District recommends the EIS also include the following discussions: A discussion of the components and phases of the project and the associated emission projections, including ongoing emissions from each previous phase.
Fracking is a serious threat to public health and the climate.
Fracking releases methane, a powerful greenhouse gas, and burning it will send the atmosphere over the tipping point.
Conflicts with Other Projects
Identify all on-going, planned, and reasonably foreseeable projects in the study area that may contribute to cumulative impacts.

Table C-11
Issue No. 6: Geology and Seismicity

Secondly, fracking could induce earthquake related activity in our state, as proven by Induced seismic activity has been linked to hydraulic fracturing/waste water disposal associated with hydraulic fracturing, and is being studied by the USGS. (http://www.usgs.gov/blogs/features/usgs_top_story/man-made-earthquakes/). Until the link between fracking and seismic activity has be DISPROVED, we can't consider it as an extraction method; the negative effects on our entire community and the colossal destruction from seismic activity is not commensurate with the benefit of extraction for the economy.

Wastewater also winds up in disposal wells, which have been linked to induced seismicity in states that have seen an increase in disposal wells. These injection wells are typically used for long-term storage of waste fluid, and thus the long term integrity and effect of these wells must be evaluated as part of the EIS and Statewide Study. Injecting and storing wastewater underground in these injection wells has been shown to cause a variety of risks, including inducing earthquakes. An increase in unconventional methods of oil and gas recovery will expand the number of these disposal wells necessary to store the flowback fluid from extraction and production activity. In an earthquake-prone state like California, it is imperative that the EIS and Statewide Study evaluate the environmental impact of making disposal wells more widespread throughout the state. (See further discussion in Section II.I, infra.)

The EIS and Statewide Study should fully assess the risk of induced seismicity caused by unconventional oil and gas extraction techniques as well as underground waste injection wells that will increase in number if oil and gas development is allowed to proliferate on public lands. California is at particular risk of induced seismicity due to the state's numerous faults and high background levels of seismic activity.

In regions of the central and eastern United States where unconventional oil and gas development has proliferated in recent years, earthquake activity has increased dramatically. More than 300 earthquakes with magnitude (M) ≥ 3 occurred between 2010 through 2012, compared with an average of 21 per year between 1967 and 2000.78 Moreover, although earthquakes with magnitude (M) ≥ 5.0 are very uncommon east of the Rocky Mountains, the number per year recorded in the midcontinent increased 11-fold between 2008 and 2011, compared to 1976 to 2007. Mid-continent states experiencing elevated levels of seismic activity include Arkansas, Colorado, New Mexico, Ohio, Oklahoma, Texas, and Virginia.

Much of this increased earthquake activity and several of the largest earthquakes in the US midcontinent in recent years have been linked to the disposal of wastewater into deep injection wells, which is well-established to pose a significant seismic risk. Earthquakes at magnitudes (M) that are felt (M3 and M4) or destructive (M4 and M5) have been attributed to wastewater injection wells in at least five states--Arkansas, Colorado, Ohio, Oklahoma, and Texas. The largest of these was a M5.7 earthquake in Prague, Oklahoma, which was the biggest in the state's history, destroying 14 homes and injuring two people. Other large earthquakes attributed to wastewater injection include an M5.3 in Colorado, M4.9 in Texas, M4.7 in Arkansas, and M3.9 in Ohio.

Other studies have found that hydraulic fracturing causes seismic activity directly. In the United Kingdom, Canada, and Oklahoma, studies have linked hydraulic fracturing to earthquakes.

Overall, the scientific literature demonstrates that the proliferation of unconventional oil and gas development, including increases in extraction and injection, will increase earthquake risk in California. Thus, the EIS and statewide study should fully assess the risk of induced seismicity cause by all unconventional oil and gas extraction and injection activities including wastewater injection wells. The analysis should assess the following issues based on guidance from the scientific literature, the National Research Council, and the Department of Energy:

(1) whether existing oil and gas wells and wastewater injection wells in California have induced seismic activity, using earthquake catalogs (which provide an inventory of earthquakes of differing magnitudes) and fluid extraction and injection data collected by industry;

(2) the fault environment on the public lands by identifying and characterizing all faults in these areas based on sources including but not limited to the USGS Quaternary Fault and Fold database and the most recent California Geological Survey Fault Activity Map GIS layer. In its analysis, the BLM should assess its ability to identify all faults in these areas, including strike-slip faults and deep faults that can be difficult to detect;

(3) the background seismicity of public lands including the history of earthquake size and frequency, fault structure (including orientation of faults), seismicity rates, failure

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mechanisms, and state of stress of faults;

(4) the geology of public lands including pore pressure, formation permeability, and hydrological connectivity to deeper faults;

(5) the hazards to human communities and infrastructure from induced seismic activity; and

(6) the current state of knowledge on important questions related to the risk and hazards of induced seismicity from oil and gas development activities, including: (a) how the distance from a well to a fault affects seismic risk (i.e., locating wells in close proximity to faults can increase the risk of inducing earthquakes); (b) how fluid injection and extraction volumes, rates, and pressures affect seismic risk; (c) how the density of wells affects seismic risk (i.e., a greater density of wells affects a greater volume of the subsurface and potentially contacts more areas of a single fault or a greater number of faults); (d) the time period following the initiation of injection or extraction activities over which earthquakes can be induced (i.e., studies indicate that induced seismicity often occurs within months of initiation of extraction or injection although there are cases demonstrating multi-year delays); (e) how stopping extraction or injection activities affects induced seismicity (i.e., can induced seismicity be turned off by stopping extraction and injection and over what period, since studies indicate that there are often delays-sometimes more than a year- between the termination of extraction and injection activities and the cessation of induced earthquake activity); (f) the largest earthquake that could be induced by oil and gas development activities in California, including fracking and wastewater injection; and (g) whether active and abandoned wells are safe from damage from earthquake activity over the short and long-term.

Induced seismicity in oil and gas production has been observed ever since the 1930s. In the last decade, a number of examples of earthquake activity related to oil and gas production, as well as injection of liquids under high pressure, have been observed. Almost all induced seismicity associated with petroleum extraction can be traced to either fluid injection or extraction. In some recent cases, injection of produced water (excess water extracted during oil and gas extraction) has produced significant seismic activity. Examples are in Colorado and Texas, where gas and oil production yield large volumes of water that must be put back underground. Mitigation can be achieved through abatement and/or redistribution of the fluids to different areas or depths.

The DEIS should discuss the potential for geological hazards such as induced seismicity or subsidence.

The DEIS should discuss how geological hazards would be monitored, and mitigation measures employed, if detrimental geological hazards are manifested by the exploration and well completion activities, as well as by underground injection of produced water or flowback water.

Induced seismic activity has been linked to hydraulic fracturing/waste water disposal associated with hydraulic fracturing, and is being studied by the USGS The USGS has found the two to be linked : (http://www.usgs.gov/blogs/features/usgs_top_story/man-made-earthquakes/). The EIS should not proceed/oil and gas development that utilizes fracking should not proceed until further

research has been completed and has disproved the link between the fracking and seismic activity. If it is not disproven, hydraulic fracturing should not be used as an extraction method because the negative impacts to other resources would outweigh the benefits of extracting the oil and gas.

Seismologists have long understood that earthquakes can be induced by the "withdrawal of fluids and gas from the subsurface, and injection of fluids into underground formations." William Ellsworth, Injection-Induced Earthquakes, DOI: 10.1126/science/1225942, Science 341, (2013). I assert that the EIS should thoroughly consider the potential of inducing seismic activity.

Induced Seismicity (Earthquakes): In other states, there is mounting evidence that the wastewater from fracking operations is causing earthquakes when injected into disposal wells. Given that California is especially prone to frequent and strong earthquakes, the BLM must fully and adequately study the dangers of induced seismicity before allowing fracking.

Water Resources Agency

The Monterey County Water Resources Agency (MCRWA) has previously expressed concern regarding the impact of potential lease areas to MCRWA water supply facilities. The Rinconada Fault lies directly under the San Antonio Dam and has been identified as a likely earthquake source. The MCRWA does not recommend approval of hydraulic

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fracturing operations within close proximity to Nacimiento and San Antonio Dams and Reservoirs due to the presence of nearby faults and the potential of hydraulic fracturing operations to impact water quality and quantity in the local area. The following must be analyzed in the EIS: - Analysis of the potential impacts of hydraulic fracturing to water quality and quantity both locally and regionally. - Analysis of the potential for increased seismic activity due to hydraulic fracturing and the potential impacts, including impacts to County operated lakes, dams and reservoirs.
Induced seismic activity caused by hydraulic fracturing/waste water disposal associated with hydraulic fracturing is being studied by the USGS and the USGS has found the two to be linked (http://www.usgs.gov/blogs/features/usgs_top_story/man- made-earthquakes/). The EIS should not proceed/oil and gas development that utilizes fracking should not proceed until further research has been completed and has disproved the link between the fracking and seismicity. If it is not disproven, hydraulic fracturing should not be used as an extraction method because the negative impacts to other resources would outweigh the benefits of extracting the oil and gas.
Disposal of produced and wastewater generated during drilling activities is a problem faced by all areas where O&G extraction occurs. Although some methods of recycling make produced water from drilling activities available for agricultural uses, there is no guarantee of its quality, and this water is classified as not safe for human or animal consumption. Reinjection activities may further degrade the quality of groundwater sources, and increase the possibility of seismic activity. Well- defined and concise plans for disposal of wastewater will help protect the quality of surface and groundwater, and prevent seismic activity.
(4) Wastewater is commonly injected into disposal wells, which have been linked to induced earthquakes in states that have seen an increase in disposal wells. Fracking itself has caused earthquakes as documented by the "Investigation of Observed Seismicity in the Horn River" (---source---British Columbia Oil and Gas Commission, August 2012). In an earthquake prone state such as California, the issue of seismicity is a major potential impact. The potential effects upon earthquake faults has yet to be studied.
(5) California's complex geology includes many unknown deep faults, geologic slip planes and other geologic formation elements that could allow chemical fracking fluids, oil and gas to escape upward into the five hundred foot deep level that is generally considered to the lower depth of most ground water basins. Fracking may occur as much as one to two miles below the earth surface, but rock faults can exist or be opened and thus allow deep salt and fracking chemical polluted water to merge with ground water over time. A geo analysis of the lands intended for possible leasing has to occur before any lease of public lands is considered. The EIS must include the geologic study sufficient to address this risk.
There is mounting evidence that the wastewater from fracking operations is causing earthquakes when injected into disposal wells. California is especially prone to frequent and strong earthquakes, the BLM must fully and adequately study the dangers of induced seismic activity before allowing fracking.
Concerned about: Impacts on known and unidentified seismic fault.
Wastewater disposal from fracking and other oil and gas extraction have also been linked to increased seismic activity.
Taking massive amounts of oil from the soil causes earthquakes and should not even be considered!
Seismological and hydrological impact assessments are critical in consideration of any land use consideration of hydrological fracturing/acid fracturing/steam fracturing techniques in oil and gas exploration. Central California does not have the water supply to support fracking without causing a severe challenge to agricultural, ranching, and residential water usage.
Studies by the University of Oklahoma have found a connection between fracking and increased seismic activity. San Benito County is the most seismically active area in North America. It is civilzational suicide to permit a practice that increases earthquakes in an active fault zone. I do not believe that we can safely risk fracking given the number of faults present in the region. I do not believe that the resources exist to permit a regulatory schema adequate to allow safe fracking.
The current Citadel Project Indian, taking place on private land six to eight miles from the Pinnacles National Park is an example of a threat to the condors. This project involves

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thermal stimulation with high pressure steam at a depth of three to six hundred feet. This is very close to the surface and in an area known for earthquakes and faults. A blowout occuring during stimulation could discharge water contaminated with oil and chemicals to the surface and pose a risk to animals and to the condors themselves.
Consider the impacts of seismic activity induced by wastewater injection would have on socioeconomics, public health and safety, and water quality.
Don't ruin our wilderness areas- the oil and gas companies own more than enough land- they don't need the Public Lands as well. Besides- fracking is so environmentally damaging- we would only get garbage back from these companies. AND FRACKING CAUSES EARTHQUAKES a proven fact- this is California - we don't need no more stinkin' earthquakes.
An EPA scientist visited our area (Coachella Valley) 13 years ago when there was the possibility of a natural gas plant going in. We are practically on top of the San Andreas fault. He came out here to get people to stop this potentially very dangerous process. Fracking causes earthquakes!!! That's why Arkansas had a moratorium on the process- because swarms of earthquakes were traced back to their origin- fracking. Not to mention, using vital water resources, chemicals in the ground that would end of elsewhere in the chain, and exacerbating the climate change problem via inevitable methane leaks. No matter how safe the process is -ACCORDING TO THEIR INDUSTRY, that is an outright lie! And the lie is provable. Don't OK this destructive and irresponsible practice.
Not to mention that there may also be a link between fracking being a possible cause of earthquakes, which could be a recipe for disaster in a state that is already seismically active.
As a member of the public who has studied geophysics, I am deeply concerned about the practice of fracking for the removal of natural gas. When I first learned of the practice I predicted earthquakes, groundwater pollution, ground subsidence, and eventual travel of the pollutants to the surface 'downstream' through aquifers, faults, and natural fissures in the bedrock. We haven't seen all these yet, but there is strong evidence of the first two in the other states. Please, do not lift the fracking moratorium in California until the environmental studies are complete, and then only if they indicate the practice has no long-term damaging effects for the environment.
California is already prone to earthquakes. As we've seen in Ohio, Arkansas, Texas, The Netherlands, and the UK- even places that aren't known for earthquakes start to have them when they start fracking.
CA does not need any additional earthquakes.
Fracking should not be allowed in seismically active California. The full consequences of fracking to precious groundwater resources and the potential effects of fracking on land subsidence and sensitive faults has not been studied sufficiently. Much remains unknown. Beyond that concern, fracking will result in even more CO2 being released into an already catastrophically altered climate. Global warming is already manifesting in our lifetimes with loss of glaciers and sea ice, erratic and destructive weather, and other rapid changes to climate that will devastate the environment, human communities, and the world's economy. Fracking, in that respect, threatens the security of the United States.
Moreover, the very real likelihood that drinking water will be contaminated with pollutants, not to mention the increased risk of earthquakes that pumping vast amounts of water underground entails, makes this a no-win situation.
Fracking uses (wastes) millions of gallons of water and fracking causes earthquakes where earthquakes are rare if ever. California is the last place to allow a planet destroying business for the sake of a job.
The USGS has confirmed fracking as the cause of earthquakes in hitherto earthquake free areas of the mid-west. Are you going to risk our already earthquake prone state to corporate made earthquakes. Who will pay for the damages to our homes and infrastructure? The Federal government? The corporations? Ha, no one. We will be stuck with that bill.
Fracking has been known to trigger earthquakes where none have occurred before. Just what California needs - less potable water and more earthquakes!

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Issue No. 6: Geology and Seismicity

The EIS should analyze potential wastewater disposal impacts on water and land resources and seismicity for unconventional oil and gas development.
In the search for oil, gas and development of federal minerals in the Central Coast, Ohlone/Costanoan- Esselen Nation objects to disturbance using the hydraulic fracturing process. Fracturing can lead to environmental risks, contamination of ground water, depletion of fresh water, contamination of the air. There are increases in earthquake activity associated with the degradation of bedrock.
Fracking is dangerous to all concerned, workers, people and other life living in the area, the environment. It should be ditched and investments made to make sustainable wind, solar and other green energy sources workable for the power grid. In California, there are 3 top reasons to continue the moratorium- damage to agriculture & water supplies and earthquakes. There is even concern that it can cause earthquakes or tremors. This is of special concern of course in California especially with Diablo Canyon nuclear power plant located on a fault zone which ties into larger systems. Fracking is a heavily polluting invasive extraction system which also has the potential to harm water supplies in a state that has water shortages. No only that, California is one of the richest agricultural zones on the planet.
California sits on earthquake generating faults that should not be disturbed by fracking, lest we end up with a worse situation. Leave the sub-stratas alone, keep fracking chemicals OUT!
We have earthquakes and fracking makes them more likely. Earthquakes have occurred in places they have never been before like Ohio. California gets its fair share and we don't need fracking to help it along.
Doesn't the simple fact that California is an earthquake zone from one end to the other register in the minds of BLM officials? Fracturing the earth intentionally in an area already heavily fractured is DANGEROUS.
Evidence in other states shows fracking contributes to ground water and well pollution and may be involved in triggering earthquakes in areas where earthquakes were formally minimal or nonexistent. California is earthquake central. DO NOT allow fracking in California. The hazards to air, water and soil pollution are known. The hazards they might present to our fault lines are not worth the risk
The BLM's studies must be completed before any decision is taken. California is earthquake prone, think about it. Fracking has already been related with seismic activities and it seems that fracking is a serious threat to public health and the climate.
Fracking has also been linked to earthquakes, California is ALREADY earthquake prone as it is.
We don't know yet what the impacts to our underground aquifers are, or the effect on earthquake faults.
Fracking causes earthquakes and trashes aquifers. Do we really need to encourage earthquakes in California?
WE haven't had a major earthquake in many years. Fracking has been linked to earthquakes!
It has also been connected to enabling earthquakes, something California does not need more of.
There is no way to frack safely. California is home to major fault lines known to cause 7+ magnitude earthquakes. Fracking is known to affect faults.
My immediate concerns are with the pressures imposed by the "fracking" fluids on earthquake faults that are known to be affected by environmental forces (ex: chemically-treated water pumped into the ground) In CA all of the active faults are known to be unknown, meaning that the "fracking" oil companies have no idea what natural disasters they are prematurely creating!
Fracking could potentially cause devastating earthquakes and would certainly require copious amounts of water. The risks and water consumption outweigh the possible benefits of fracking

Table C-11
Issue No. 6: Geology and Seismicity

Knowing that hydraulic fracture releases poisonous material into the air and water supply; destroys bedrock formations necessary to the stability of cities; and extracts negligible amounts of fuel in exchange for centuries' worth of pollution; we ask a prohibition thereof until superior fuels are in nationwide use, by all classes of society.
There is also the possibility of increased earthquake activity. There needs to be unbiased and thorough studies performed on this factor, as well.

Table C-12
Issue No. 7: Soil Resources

On May 31, 2013, the US District Court for the Northern District of California ruled in Center for Biological Diversity v. Bureau of Land Management that BLM violated the National Environmental Policy Act3 ("NEPA") in issuing oil and gas leases without first analyzing the full extent of extreme extraction techniques such as hydraulic fracturing. Where such activity has occurred in other states, the environmental impact has been considerable. Water, air, soil, wildlife, and the climate have all been harmed by the expansion of unconventional extraction methods.

The DEIS should include a comprehensive analysis of potential impacts to the quality of surface water and groundwater resources and evaluate the following activities for their impacts:

- o Waste management, including use, reuse, recycling and disposal of oil and gas produced and flowback water.
- o Impacts to shallow aquifers from oil and gas well drilling, well completion and production.
- o Management of spills or leaks from surface impoundments, oil and gas pits, or produced water evaporation ponds.
- o Erosion and sedimentation impacts associated with surface disturbance, including those associated with roads, well pad construction, well drilling and completion, and pipelines.

- As part of completing the aforementioned evaluation, the following resource impacts should be discussed, including disclosure of which waters may be impacted, the nature of potential impacts, and specific pollutants likely to impact those waters:

- o Groundwater: Potential impacts to groundwater, including municipal or private water supplies. We recommend that this include an analysis of the management of any fluids that will be injected underground for well completion, including the toxicity and fate of these fluids, with a focus on avoiding surface spills or leaks of these fluids.
- o Impaired Waterbodies: Potential impacts to impaired waterbodies, including waterbodies listed on the CWA § 303(d) list and waterbodies with completed Total Maximum Daily Loads (TMDLs).
- o Surface Water Quality and Sedimentation: Potential impacts to water quality from runoff associated with surface disturbance. Erodible soils can represent a significant nonpoint source, and runoff could introduce sediments, as well as salts, selenium and other heavy metals into surface waters. To ensure sufficient information is included about the potential impacts of soil disturbance, we recommend that the DEIS include an estimate of erosion rates for each alternative in tons per year based on amount of surface disturbance, soil types, topography and slope, to avoid significant sedimentation.

The EIS should study the full range of adverse environmental effects that stem from oil and gas development. These include Air , Water, and Soil Contamination - Oil and gas development release a number pollutants that degrade the quality of our air, water, and soil.

The EIS should study all environmental impacts made more severe by fracking and other types of unconventional oil and gas extraction. These include:

o Air, Water, and Soil Contamination: Fracking uses hundreds of chemicals that are known to have adverse human health impacts. Numerous instances of contamination have been reported in places where fracking has occurred. The EIS must include an analysis of adverse human health impacts from all of the chemicals used in the fracking process, as well as from those chemicals used in other types of unconventional oil and gas extraction techniques.

In California, fracking threatens the soil and water quality that are essential to the state's wine, agricultural and fishing industries. While no government agency currently keeps track of fracking activities in California, BLM estimates that 90 percent of wells drilled on Indian and Federal lands are fracked. 77 Fed. Reg. 27,691, 27,693 (May 11, 2012).

BLM currently leases over 36 million acres of land a land area equal in size to the state of Michigan - for potential oil and gas development in 24 states, and periodically offers more land for leasing. BLM is initiating a planning process to address oil and gas development on public lands and federal mineral estate in California, and may amend the Resource Management Plans ("RMPs") for some of BLM's California field offices. To help inform the planning process, BLM is also initiating a scientific assessment of the current state of practices for well completion and stimulation in California. This science assessment will be led by the California Council on Science and Technology, and will be peer-

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reviewed.
Under current practices in California, some flowback fluid is stored in open pits near the well pad. The EIS and Statewide Study must review the risks posed by these pits, which can contaminate the soil, pollute nearby surface water through breaches and spills, and pollute the air through evaporation. Liners are known to tear, and spills and evaporation occur even when the lining remains intact. Both can kill wildlife that is exposed to the pits' toxic contents.
Include, in the DEIS, a list of BMPs that may be required to protect surface water and groundwater resources, and the circumstances under which the BMPs would be applied (e.g., proximity to surface water resources, presence of erosive soils, slope, shallow water aquifers, proximity of water wells, etc.).
Explain, in the DEIS, how the BLM would ensure that the BMPs would be monitored and enforced.

Table C-13
Issue No. 8: Socioeconomics

Farming and Agriculture
Surface water contamination Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, described above, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners. As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities. The EIS and Statewide Study should fully assess the risk of harm to surface waters as well as the feasibility of restoring the original water quality once surface water is contaminated.
Concerned about: Aquifer contamination affecting human and agriculture use. (potential contamination and subsequent loss)
Lifting the current ban on fracking on BLM land is a game of long and short-term risk. Risk to depleteing water in some of the more arid environments in the state; example- San Benito County where I live. California places nature, people and agriculture at odds over water. The state supplies almost 50% of the nation's fresh food. 10 year estimates increase our state population to 50 million people. The current drought threatens Coho salmon with extinction. Can we really afford to add powerful corporate oil interests to the tug of war on water?
The EIS must justify the water use required in hydraulic fracturing and analyze how the use of water for oil and gas development will result in socioeconomic impacts, including socioeconomic impacts to individuals involved in the agricultural industry
It doesn't take a El statement to understand that California cannot tolerate fracking. The ongoing drought and persistent year-round forest fires make it extremely dangerous, to say nothing of the farming industry. You do realize, don't you, that this state feeds well over half the country.
Fracking is dangerous to all concerned, workers, people and other life living in the area, the environment. It should be ditched and investments made to make sustainable wind, solar and other green energy sources workable for the power grid. In California, there are 3 top reasons to continue the moratorium- damage to agriculture & water supplies and earthquakes. There is even concern that it can cause earthquakes or tremors. This is of special concern of course in California especially with Diablo Canyon nuclear power plant located on a fault zone which ties into larger systems. Fracking is a heavily polluting invasive extraction system which also has the potential to harm water supplies in a state that has water shortages. No only that, California is one of the richest agricultural zones on the planet.
Please don't risk California's billion dollar agriculture industry by polluting all the aquifers in California and causing irreparable damage!
As a bigger umbrella agency BLM must discourage and reject any request for stimulation well. California senate districts (illegible) count on Livestock, agricultural to water storage are lifeline in those counties. No fracking there.
Have the good citizens who are running this session taken the time to watch the movie gaslands one and two? Have you read the results of studies and interviews with people in Texas, the Bakken fields in North Dakota and New York State where the Marcellus Shale has been fracked into a new kind of hell on earth. Unfortunately, only after their lovely farmland has been destroyed did the people of New York State vote to stop fracking- too little, too late. And this vote was taken against the advice and will of the governor of the state and his allies- the billionaire corporate executives who buy and sell our representatives.
Socioeconomics
Aesthetic impacts: Monterey County is known for its beautiful landscapes and has worked to protect them through General Plan policies. Tourism is an important part of the county economy and the views and aesthetic that visitors come from around the world to enjoy is critical to the tourism industry. Analysis of the visual/aesthetic impacts from new industrial development in open lands should be included in the EIS as well as an economic analysis of the potential impacts to tourism.

Table C-13
Issue No. 8: Socioeconomics

Housing: Include an analysis of the potential impact to housing from an influx of new workers into rural areas. Temporary workers as well as migration of new workers into an area can impact housing availability, prices and the quality of life in a community.
Schools: Include analysis of impacts of new workers to schools.
Nor has there been a change in circumstances to warrant disturbing these criteria and goals, even if adjustments to the 2006 RMP ultimately are considered. On the contrary, federal policy is clear that energy development should be encouraged on federal lands, within the parameters of federal and state environmental laws as part of an "all of the above" energy strategy. In fact, Secretary Jewell recently explained that shale oil development using hydraulic fracturing "is a perfect example of how new and improved technology is allowing industry to tap previously inaccessible or unknown energy resources to create jobs, decrease our dependence on foreign oil, and grow our economy."
Lastly, fracking is most likely to take place near disadvantaged communities. The social justice implications of this are unfair. As many limitations as possible should be placed on fracking. The environmental, health, and socioeconomic impacts aren't worth it.
In California, fracking threatens the soil and water quality that are essential to the state's wine, agricultural and fishing industries. While no government agency currently keeps track of fracking activities in California, BLM estimates that 90 percent of wells drilled on Indian and Federal lands are fracked. 77 Fed. Reg. 27,691, 27,693 (May 11, 2012). BLM currently leases over 36 million acres of land a land area equal in size to the state of Michigan - for potential oil and gas development in 24 states, and periodically offers more land for leasing. BLM is initiating a planning process to address oil and gas development on public lands and federal mineral estate in California, and may amend the Resource Management Plans ("RMPs") for some of BLM's California field offices. To help inform the planning process, BLM is also initiating a scientific assessment of the current state of practices for well completion and stimulation in California. This science assessment will be led by the California Council on Science and Technology, and will be peer-reviewed.
Then there's the simple fact that oil drilling of any kind is development and development means the reduction in pristine natural beauty. Federal public lands include some of the most biologically diverse and ecologically important land in California. Allowing oil and gas activity, including operations that employ fracking, to occur in these areas is an unacceptable risk and is not compatible with the area's agricultural and tourism economy. Once open space habitats are developed and the land is contaminated you can't get them back to their original state. They will be gone forever.
I also consider myself an advocate for JOBS in our state. You see, last Thursday was not a good day for me- I lost my job. The subject of employment is one that is close to my heart and to my family's livelihood. I read a statistic that for every one job created by the Petroleum Industry, there are 7 additional jobs created in the community. There has to be a way to find a healthy balance here. The first step is to allow well stimulation per SB4 and the BLM hydraulic fracturing rule. We also need to find a way to allow it to occur in a safe manner. The current Secretary of Energy, EPA Adminstrator and other current and former Obama Administration officials have repeatedly stated that hydraulic fracturing poses no unmanageable threats to the environment, and that no evidence has been seen to indicate that this technology h caused any harm to groundwater. Hydraulic fracturing has been happening in California for years and in a manageable way! Responsible energy resource extraction on public lands can provide much-needed jobs, revenues and energy security while protecting the environment. We need jobs in this state. I for one WANT a job again. I want to be able to go back to work and work in a stable position through retirement. Job security won't happen until stability is put back in the petroleum industry in California. And I k now that I'm not alone in my views. Let's find a way to work together on this and allow well stimulation per SB4 and the BLM Hydraulic Fracturing Rule to proceed

Table C-13
Issue No. 8: Socioeconomics

AND create jobs, revenues and energy security in our state.
You will likely hear an argument that opening more areas to oil and gas drilling will create jobs and spur economic growth, and that any environmental considerations must be balanced against these economic imperatives. But what kind of jobs? No matter how much it pays, a job cannot be said to be "good" if it contributes to the kind of world-changing destruction we face with climate change. And what kind of economy? An economy based on carbon fuels will necessarily flounder. I believe it was David Brower who observed that the economy is a wholly owned subsidiary of the ecology. As the global environment deteriorates due to climate change, we humans will find it more and more difficult to sustain ourselves (as fisheries go belly up, forests die, agriculture becomes impossible in many areas and more difficult and tenuous in others, etc.). At the same time, we will, at minimum, be buffeted by violent storms, droughts, floods, rising seas levels, and prolonged periods of extreme temperatures. Who can imagine a robust growing economy in such circumstances? We, and all our endeavors, are irrevocably tied to the natural world. As we destroy that world, we too will suffer the consequences. There are times when balancing competing interests is appropriate, and times when it is not. It is not appropriate when facing an existential crisis, as we are now.
Furthermore, the permanent risks to Central California's aquifer and wells from fracking fluid contamination are too permanent and too great to consciously permit fracking. Oil exploration cannot come at the detriment of agriculture, ranching, and tourism, which are the fundamentals of San Benito economy.
The Pinnacles National Park provides significant resources for San Benito County, the State of California and the nation. It offers a wealth of biodiversity, recreational and educational opportunities and generates income for local businesses as well as state and federal agencies. The eastern side of the park is located in a fairly remote location and served by a single two lane highway. Tracts of land administered by the Bureau surround the park and the access highway. Significant oil and gas development within sight of the park and/or the highway would ruin the rural landscape and potentially impact visitation to the park and the influx of tourist dollars into the area and should be prohibited. An example of this is seen in New Mexico around the Carlsbad Caverns NP where oil and gas development have created a wasteland. Significant truck traffic associated with oil and gas development would pose a danger to wildlife and the public on rural Highway 25.
The EIS must explain all health and safety impacts of the accident scenarios and all the socioeconomic impacts
The EIS must justify the water use required in hydraulic fracturing and analyze how the use of water for oil and gas development will result in socioeconomic impacts, including socioeconomic impacts to individuals involved in the agricultural industry
Consider the impacts of seismic activity induced by wastewater injection would have on socioeconomics, public health and safety, and water quality.
California's economy is agricultural based, we feed the nation. Anything that threatens the scarce, precious water of California should immediately be suspect and never allowed.
Not only is fracking bad environmentally, it will destroy property values as we have reported: http://www.enviroreporter.com/ 2013/08/fracked-nation/

Table C-14
Issue No. 9: Traffic

The equipment and ingredients used in production also require heavy truck traffic, both to haul necessary components into the site, and to haul them away; increased traffic will also have an impact on the environment. New roads will be built where none existed before. Existing roads will dilapidate at a faster rate under the increased burden of trucks going to and from a well site.
So-called "closed loop" systems, which store flowback in tanks, still have potential environmental impacts. Even with reduced emission completions, spills and fugitive emissions can still cause soil, water, and air contamination. Using tanks does not obviate the need for trucks and pipes to transport flowback and waste water fluid to offsite disposal facilities. As mentioned above, increased truck traffic also has deleterious effects on the environment through increased traffic, air emissions, and spills.
Oil and gas production on public lands has the potential to dramatically and permanently change the landscape of California. Countless acres of public land may have to be leveled to allow for the construction and operation of well pads and related facilities such as wastewater pits. Roads may have to be constructed or expanded to accommodate trucks transporting chemicals and the large quantities of water needed for some recovery methods. Expansion of roads will lead to fragmentation of habitats for wildlife, increased potential for the introduction of invasive species, and harm to endangered and threatened species in California. Each of these effects is discussed in greater detail below. The photos below illustrate how the landscape can change once unconventional oil and gas activity begins.
Resource Management Agency- Public Works Department The Monterey County RMA-Public Works Department is responsible for maintenance of all County roads and transportation facilities. - Analysis of the impact of increased traffic, including heavy trucks, on all county, regional and city roadways should be included in the EIS. - The geographic area covered in the scope of the traffic study should be of sufficient size to adequately identify all potential impacts, including congestion, traffic management and impacts to infrastructure. - Mitigation measures for all traffic circulation and pavement impacts on County roads should be included. - Many of the County roads that will potentially be impacted are rural roads that are used primarily for local traffic. The EIS should include analysis of the needs and benefits of providing pedestrian/bicycle facilities as well as carpool/vanpool and other alternative modes of transportation that would reduce peak demand on roadways in the project area
Increased traffic on underdeveloped and rural roads, along with increased construction and operation activities, will have a detrimental impact on air quality and other resources. A complete cumulative impacts study is necessary in order to fully analyze the results of increased O&G development in these areas, such as decreased land use for agriculture, cattle grazing, and recharge areas for groundwater.

Table C-15
Issue No. 10: Tribal and Cultural Resources

Cultural and Heritage Resources
Consultation for tribal cultural resources is required under Section 106 of the National Historic Preservation Act. Historic properties under the NHPA are properties that are included in the National Register of Historic Places or that meet the criteria for the National Register. Section 106 of the NHPA requires a federal agency, upon determining that activities under its control could affect historic properties, consult with the appropriate State Historic Preservation Officer/Tribal Historic Preservation Officer. Under NEPA, any impacts to tribal, cultural, or other treaty resources must be discussed, and measures to mitigate such impacts must be identified. Section 106 of the NHPA requires that Federal agencies consider the effects of their actions on cultural resources, following regulation in 36 CFR 800.
Executive Order 13007, Indian Sacred Sites (May 24, 1996), requires federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian Religious practitioners, and to avoid adversely affecting the physical integrity, accessibility, or use of sacred sites. It is important to note that a sacred site may not meet the National Register criteria for a historic property and that, conversely, a historic property may not meet the criteria for a sacred site.
The DEIS should address the potential existence of Indian sacred sites in the project areas. It should address Executive Order 13007, distinguish it from Section 106 ofthe NHPA, and discuss how the BLM will avoid adversely affecting the physical integrity, accessibility, or use of sacred sites, if they exist.
The DEIS should provide a summary of all coordination with Tribes and with the State Historic Preservation Officer/Tribal Historic Preservation Officer, including identification of NRHP eligible sites, and development of a Cultural Resource Management Plan.
The Juan Bautista de Anza National Historic Trail (Anza Trail) is located within the Hollister RMP project area. Oil and gas leasing and development has the potential for negative effects on the Anza Trail, including, but not limited to, archaeological resources, visual resources, recreation, and noise. NPS is the overall administrator and coordinator for implementation and interpretation of the Anza Trail, and we request the opportunity to review and comment on the EIS for the RMP amendment when it is available for review. The RMP amendment should identify the Anza Trail corridor, recognize our planning goals, and incorporate protections and plans for the Anza Trail consistent with the BLM's National Scenic and Historic Trails Manual (No. 6250 & 6280). For further information about Anza Trail cultural and natural resources and visitor recreational opportunities, please contact Naomi Torres, Superintendent, Juan Bautista de Anza National Historic Trail, 333 Bush St., Ste.500, San Francisco, CA 94104 (415) 623-2340.
Ohlone/Costanoan-Esselen Nation is the legal tribal government representative for over 600 enrolled members of Esselen, Carmeleno, Monterey Band, Rumsen, Chalon, San Carlos Mission and/or Costanoan Mission Indian descent. Though other indigenous people may have lived in the area, the area is the indigenous homeland of our people. Included with this letter please find a territorial map by Taylor 1856; Levy 1973; and Milliken 1990, indentifying Tribal areas. At this time are unable to provide you with cultural resource information but ask that OCEN be contacted upon any findings on this project
Ohlone/Costanoan-Esselen Nation objects to all excavation in known cultural lands, even when they are described as previously disturbed, and of no significant archaeological value. Please be advised that it is our first priority that our ancestor's remains be protected and undisturbed. We desire that all cultural and sacred items be left with our ancestors on site or where they are discovered. We ask for the respect that is afforded all of our current day deceased, by no other word these burial sites are cemeteries, respect for our ancestors as you would expect respect for your deceased family members in today's cemeteries. Our definition of respect is no disturbance.
Special Management Areas
The Juan Bautista de Anza National Historic Trail (Anza Trail) is located within the Hollister RMP project area. Oil and gas leasing and development has the potential for negative effects on the Anza Trail, including, but not limited to, archaeological resources, visual resources, recreation, and noise. NPS is the overall administrator and coordinator for implementation and interpretation of the Anza Trail, and we request the opportunity to review and comment on the EIS for the RMP amendment when it is available for review. The RMP amendment should identify the Anza Trail corridor, recognize our planning goals, and incorporate protections and plans for the Anza Trail consistent with the BLM's National Scenic and Historic Trails Manual (No. 6250 & 6280). For further information about Anza Trail cultural and natural resources and visitor recreational opportunities, please contact Naomi Torres, Superintendent, Juan Bautista de

Table C-15
Issue No. 10: Tribal and Cultural Resources

Anza National Historic Trail, 333 Bush St., Ste.500, San Francisco, CA 94104 (415) 623-2340.
Tribal Interests and Native American Religious Concerns
The DEIS should address the potential existence of Indian sacred sites in the project areas. It should address Executive Order 13007, distinguish it from Section 106 of the NHPA, and discuss how the BLM will avoid adversely affecting the physical integrity, accessibility, or use of sacred sites, if they exist.
The DEIS should provide a summary of all coordination with Tribes and with the State Historic Preservation Officer/Tribal Historic Preservation Officer, including identification of NRHP eligible sites, and development of a Cultural Resource Management Plan.

Table C-16
Issue No. 11: Environmental Justice

The EIS and Statewide Study must include an analysis of environmental justice impacts, that is, the potential for increased oil and gas production activity to disproportionately affect poor, minority, or underrepresented communities. The analysis focus not only on such communities that are proximate to well sites, but also to communities that will be affected by (1) air pollution because they are located downwind from the site, (2) water pollution from being downstream, (3) groundwater contamination from using underground sources that are exposed to fluid migration, and (4) communities disproportionately affected by the impact of climate change.
Many BLM lands are located near environmental justice communities throughout the nation. In California, the BLM manages land in Kern County above the Monterey Shale. Kern is home to many low income communities, communities of color, and Spanish speaking communities. These communities already bear disproportionate burdens from air, water, and pesticide pollution. These communities are consistently ranked as having the worst air pollution in the country. It is critical that the EIS and Statewide Study analyze the impacts increased oil and gas production has on communities like those found in Kern County.
When examining the increased oil and gas production activity's effect on communities disproportionately impacted by climate change, communities far from the drilling need to be considered, communities such as the Native Village of Kivalina in Alaska. The small Inupiaq village north of the Arctic Circle, which will be forced to relocate due to the melting ice pack, and many like it, are feeling the effects of global warming first and worst. Any analysis of the environmental justice impacts of increased oil and gas production must look at the effect of that increased production on climate change, and the corresponding disproportionate effects on environmental justice communities.
Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," applies to federal agencies that conduct activities that substantially affect human health or the environment. Consistent with this order, the EPA recommends the NEPA analysis disclose and evaluate any environmental justice concerns associated with impacts to minority and low- income communities from the potential build-out for the reasonably foreseeable development scenario.
A general evaluation of the geographic scope of the impact area and identification of minority, low-income, and tribal communities within that scope.
A determination of whether there may be disproportionately high and adverse impacts, including cumulative impacts, on the identified communities.
If there are no applicable Environmental Justice considerations, then that should be disclosed.
Disclosure of EJ communities in the impact area, including a description ofthe methodology and criteria utilized for identifying low income and minority communities, the sources of data used for these analyses, and the references used for establishing the criteria.
The EPA recommends comparing census block group percentages (if available, or, at a minimum, census tract data) for below poverty and minority populations with the state average. If a block group percentage is greater than the state average, we recommend further analysis regarding the potential for disproportionate adverse impacts. The EPA does not recommend use of higher thresholds, which may fail to identify an EJ community in the situation where the minority or low income population percentage of the affected area is meaningfully greater than the corresponding population percentage in the state (but less than the specific ratio selected).
To the extent information is available, perform a detailed assessment of environmental justice and other socioeconomic concerns for any communities that have. below poverty or minority populations greater than the state average. We recommend the assessment include the following information: o A discussion of the potential direct, indirect and cumulative environmental impacts of oil and gas development on the health of these communities, including air quality and water quality impacts. o An evaluation of the socio-economic impacts to the local communities, including the potential for any additional loading placed on local communities' abilities to provide necessary public services and amenities resulting from implementation of mineral development activities (e.g., housing, recreation, tourism, transportation, emergency response, etc.).
If any disproportionate adverse impacts are identified, we recommend that the BLM consider mitigation measures to reduce those impacts and involve the affected communities in developing the measures. The EPA recognizes the need for early involvement of the local communities, and supports the meaningful participation of community

Table C-16
Issue No. 11: Environmental Justice

representatives in the NEPA process. We encourage the BLM to thoroughly disclose all efforts taken to ensure effective public participation. For additional information, please consult the EPA's website on NEPA and environmental justice at: http://www.epa.gov/compliance/nepa/nepaej/index.html
Lastly, fracking is most likely to take place near disadvantaged communities. The social justice implications of this are unfair. As many limitations as possible should be placed on fracking. The environmental, health, and socioeconomic impacts aren't worth it.
Scoping and other key decisions on the EIS and RMP will have a substantial effect on the final assessment on environmental impacts. The public's heightened interest in this issue and the enormous potential effect that oil and gas development will have on the environment and public health mandate that the public be given a full and fair opportunity to provide its input through several public hearings. People throughout California live amongst and neighboring public lands and will be directly affected by any oil and gas development on them.
BLM should also study the disproportionate impact of oil, gas and geothermal leases on communities already overburdened with these extractive industries and other forms of pollution.

Table C-17
Issue No. 12: Land Use

The DEIS should describe the selected methods for protecting air quality (which can include emission standards or limitations, best management practices, control technologies, and considerations of the pace of development) and the regulatory mechanisms the BLM will use to ensure their implementation (including lease stipulations and conditions of approval, notices to lessees, and permit terms and conditions). We look forward to participating in the technical workgroup to help identify reasonable mitigation measures once more is known about potential future mineral development.

We also recommend that the DEIS analyze methods for restricting actions in these important resource areas and developing and enforcing BMPs to mitigate the potential impacts of the project. More specifically, the EPA suggests that the DEIS:

- Include a development buffer to protect wetlands, riparian areas and floodplains. A buffer will help to prevent erosion and sedimentation impacts in sensitive soils, possible spills or leaks from reaching surface water resources, impacts to wetland plants in unique wetlands such as springs and seeps, which can be difficult to replace (e.g., compensatory mitigation through restoration or creation may not be feasible), or disturbance to surface or groundwater hydrology which could impact the viability of wetlands.

- Identify specific mitigation requirements and BMPs applicable to the operator for all phases and actions involved in drilling and production to prevent direct and/or indirect impacts that may exist despite the No Surface Occupancy stipulation (e.g., water quality or hydrologic impacts).

- As future development proceeds, the EPA encourages the BLM to require delineation and marking of perennial seeps, springs and wetlands on maps and on the ground before development so operators can avoid impacts to them.

(9) The impact of the conversion of land use from its present condition to that of oil and gas production, is a major issue that needs to be thoroughly addressed in the EIS. Oil and gas production on public lands has the potential to fundamentally and permanently change the landscape of California. Thousands of acres of public land may be tractor leveled for the construction and operation of well pads, wastewater pits and other uses. Roads will be constructed to accommodate heavy trucks. Major negative impacts upon wildlife, wildlife habitats and scenic landscapes are inevitable. Streams and springs will dry up or be severely diminished and or polluted.

The manner in which BLM makes decisions about which areas of land to offer for oil and gas leasing and the criterion for how these lands are selected must be laid out in clear and unequivocal terms. The conservation of wildlife and their habitats must be a fundamental condition of any decision regarding what lands may be leased. The protection of wildlife is a major issue for every member of the Sierra Club. The EIS will be insufficient if it does not address these matters of wildlife habitats with full candor and clarity.

Specifically, the first step of the mitigation hierarchy- avoidance- is critical to achieving a number of objectives, including protecting nature, maintaining the benefits that ecosystems provide, promoting the sustainable yield and management of natural resources, and conserving species. Avoidance is the principle that development (in this case oil and gas development) occur in locations that entirely avoid the most ecologically important and/or sensitive habitats. As part of the oil and gas EIS, it is particularly important that the BLM identify landscapes that are not appropriate for oil and gas development. This evaluation requires criteria that reach beyond those that have been used for current protective designations1. These areas should be identified as oil and gas lease avoidance areas, and permanently withdrawn from leasing consideration. Master Leasing Plans, very recently endorsed by Secretary Jewell as planning pathways to implement oil and gas leasing while avoiding conflicts with ecological resources across a landscape, should be considered as one option to establish avoidance areas, supplementing, on a finer scale, the agency's resource management plan toolbox.

Table C-18
Issue No. 13: Livestock Grazing

As a bigger umbrella agency BLM must discourage and reject any request for stimulation well. California senate districts (illegible) count on Livestock, agricultural to water storage are lifeline in those counties. No fracking there.

Table C-19
Issue No. 14: Recreation

Surface water contamination Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, described above, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners. As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities. The EIS and Statewide Study should fully assess the risk of harm to surface waters as well as the feasibility of restoring the original water quality once surface water is contaminated.
Aesthetic impacts: Monterey County is known for its beautiful landscapes and has worked to protect them through General Plan policies. Tourism is an important part of the county economy and the views and aesthetic that visitors come from around the world to enjoy is critical to the tourism industry. Analysis of the visual/aesthetic impacts from new industrial development in open lands should be included in the EIS as well as an economic analysis of the potential impacts to tourism.
The Juan Bautista de Anza National Historic Trail (Anza Trail) is located within the Hollister RMP project area. Oil and gas leasing and development has the potential for negative effects on the Anza Trail, including, but not limited to, archaeological resources, visual resources, recreation, and noise. NPS is the overall administrator and coordinator for implementation and interpretation of the Anza Trail, and we request the opportunity to review and comment on the EIS for the RMP amendment when it is available for review. The RMP amendment should identify the Anza Trail corridor, recognize our planning goals, and incorporate protections and plans for the Anza Trail consistent with the BLM's National Scenic and Historic Trails Manual (No. 6250 & 6280). For further information about Anza Trail cultural and natural resources and visitor recreational opportunities, please contact Naomi Torres, Superintendent, Juan Bautista de Anza National Historic Trail, 333 Bush St., Ste.500, San Francisco, CA 94104 (415) 623-2340.
The Pinnacles National Park provides significant resources for San Benito County, the State of California and the nation. It offers a wealth of biodiversity, recreational and educational opportunities and generates income for local businesses as well as state and federal agencies. The eastern side of the park is located in a fairly remote location and served by a single two lane highway. Tracts of land administered by the Bureau surround the park and the access highway. Significant oil and gas development within sight of the park and/or the highway would ruin the rural landscape and potentially impact visitation to the park and the influx of tourist dollars into the area and should be prohibited. An example of this is seen in New Mexico around the Carlsbad Caverns NP where oil and gas development have created a wasteland. Significant truck traffic associated with oil and gas development would pose a danger to wildlife and the public on rural Highway 25.

Table C-20
Issue No. 15: Visual Resources

In addition, the EIS and Statewide Study should study the human health and safety impacts of noise pollution, light pollution, and traffic accidents resulting from oil and gas leases on federal land.
Aesthetic impacts: Monterey County is known for its beautiful landscapes and has worked to protect them through General Plan policies. Tourism is an important part of the county economy and the views and aesthetic that visitors come from around the world to enjoy is critical to the tourism industry. Analysis of the visual/aesthetic impacts from new industrial development in open lands should be included in the EIS as well as an economic analysis of the potential impacts to tourism.
The Juan Bautista de Anza National Historic Trail (Anza Trail) is located within the Hollister RMP project area. Oil and gas leasing and development has the potential for negative effects on the Anza Trail, including, but not limited to, archaeological resources, visual resources, recreation, and noise. NPS is the overall administrator and coordinator for implementation and interpretation of the Anza Trail, and we request the opportunity to review and comment on the EIS for the RMP amendment when it is available for review. The RMP amendment should identify the Anza Trail corridor, recognize our planning goals, and incorporate protections and plans for the Anza Trail consistent with the BLM's National Scenic and Historic Trails Manual (No. 6250 & 6280). For further information about Anza Trail cultural and natural resources and visitor recreational opportunities, please contact Naomi Torres, Superintendent, Juan Bautista de Anza National Historic Trail, 333 Bush St., Ste.500, San Francisco, CA 94104 (415) 623-2340.
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Appendix D
Verbal Comments From Scoping Meetings

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APPENDIX D
VERBAL COMMENTS FROM SCOPING MEETINGS

Verbal Comments from Scoping Meetings
January 2014 to February 2014

Hollister, CA – January 29, 2014

Attendees expressed concern about impacts from hydraulic fracturing on geology, including the potential for induced seismicity and the creation of sinkholes.

Attendees expressed concern about oil and gas leasing and development as it relates to air quality, climate change, and drought.

Attendees expressed concern about the impacts from hydraulic fracturing on both water quality and water supply, including potential damage to aquifers.

Attendees expressed concern about the safety of chemicals involved in the hydraulic fracturing process and the public health and environmental risks if these chemicals contaminated groundwater.

Attendees expressed concern about hydraulic fracturing contaminating air, water, and soils.

Attendees expressed a desire for the BLM to consider the impacts that oil and gas development and hydraulic fracturing have had in other parts of the state, country, and world.

Attendees had questions about how the BLM and its decisions will work with other agencies such as the Division of Oil, Gas and Geothermal Resources (DOGGR) for consistent management of oil and gas development and hydraulic fracturing.

Attendees opposed any additional oil and gas development in California.

Attendees supported bans on hydraulic fracturing.

Attendees expressed concern about the BLM paying attention to public comment and public interests in conservation.

Attendees offered reference material to encourage the BLM to limit the scope of the analysis to the suggested data source.

A single attendee expressed concern about the environmental justice impacts of the BLM allowing hydraulic fracturing and oil and gas development.

A single attendee stated that they are involved in a lawsuit to stop hydraulic fracturing.

A single attendee supported the effort to facilitate oil and gas lease sales.

A single attendee requested that the BLM narrow the scope of the project to oil and gas leasing and exclude analysis of other resources.

Sacramento, CA – February 4, 2014

Attendees expressed concern about California's drought and the impacts from oil and gas development and hydraulic fracturing on water supply, especially drinking water.

Attendees expressed concern about chemicals from hydraulic fracturing contaminating groundwater and the resulting impact on public and environmental health.

Attendees expressed concern about oil and gas development contributing to the release of greenhouse gases such as methane and the subsequent impact on air quality and climate change.

Attendees had questions and concerns about hydraulic fracturing causing induced seismicity and triggering earthquakes.

Attendees expressed concern about the oil and gas development infrastructure (such as well casings) failing and contributing to pollution.

Attendees requested analysis of the impact of oil and gas development on California wildlife species and special examination of special status species.

Attendees expressed support for banning hydraulic fracturing specifically and oil and gas development in general.

Attendees expressed support for analysis of No Hydraulic Fracturing and No Action alternatives.

Attendees were interested in the BLM's multiple use and sustained yield mandates and how the BLM will balance oil and gas development with conservation.

Attendees encouraged the BLM to coordinate with other agencies.

Attendees requested that the BLM focus only on oil and gas leasing for federal mineral estate.

Attendees had questions about earthquakes, the location of the Monterey Shale, and the application of other federal policies such as the Clean Water Act and Clean Air Act.

Attendees expressed concern about where the BLM would source its information.

Attendees requested that the BLM pay attention to public opinion on hydraulic fracturing.

A single attendee recommended that the BLM build off of the 2007 RMP.

A single attendee expressed concern about the impact of oil and gas leasing and development on farmlands and other lands across the state.

A single attendee stated that current regulation and information supports oil and gas leasing.

A single attendee expressed concern about the transportation of chemicals and fuels for oil and gas development through communities and the impact of accidents.

A single attendee asked the BLM to halt oil and gas leasing until the EIS is completed.

A single attendee expressed concern about the impacts from oil and gas leasing on historic sites and cultural resources.

A single attendee encouraged the BLM to complete the EIS quickly.

Salinas, CA – February 11, 2014

Attendees expressed support for oil and gas development and its positive impacts on employment.

Attendees expressed concern oil and gas development and the resulting impacts on agriculture-related jobs and the quality and supply of water resources for agriculture.

Attendees expressed concerns about the impacts of oil and gas development, including hydraulic fracturing, on public health.

Attendees expressed concerns about the impacts of hydraulic fracturing on water quality and supply.

Attendees expressed concerns about oil and gas development contributing to climate change.

Attendees expressed concerns about the impacts of oil and gas development on geology and soils, including the potential for acidization of soils, induced seismicity, and sinkholes.

Attendees requested that the BLM promote renewable energy development instead of oil and gas.

Attendees requested that the BLM narrow the scope of the project to oil and gas leasing and exclude analysis of other resources.

Attendees encouraged the BLM to work with DOGGR.

Attendees encouraged the BLM to observe its public mandates.

Attendees supported the BLM allowing oil and gas leases for hydraulic fracturing.

Attendees supported a ban on hydraulic fracturing.

A single attendee expressed concern about the transportation of chemicals and fuels for oil and gas development through communities and the impact of accidents.

A single attendee asked who will be responsible for cleaning up spills and contamination resulting from oil and gas development.

A single attendee stated that hydraulic fracturing has not been shown to impact groundwater.

A single attendee offered references to the BLM.

A single attendee supported the effort to facilitate oil and gas lease sales.

Coalinga, CA – February 12, 2014

A single attendee had questions about other meetings and expressed appreciation for the public scoping meeting and process.

A single attendee expressed support for the EIS.

A single attendee encouraged the BLM to work with DOGGR.

A single attendee requested that the BLM limit the scope of the EIS to changes in oil and gas development since the 2007 RMP.

A single attendee offered references to the BLM.

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Appendix E

References Substantially Discussed in Comments

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Appendix E
References Substantially Discussed in Comments

Below is a list of literature cited or suggested for BLM review in comments. This list includes substantively discussed, peer-reviewed literature, as well as government reports and records, web-based databases, and analogues from locations outside California.

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Appendix F

Social and Economic Workshop Summary Report

US Department of the Interior

Bureau of Land Management
Hollister Field Office, California

Hollister Oil and Gas Environmental Impact Statement and
Resource Management Plan Amendment

Social and Economic Workshop Summary Report

March 2015

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SECTION 1 INTRODUCTION

1.1 Purpose of Social and Economic Workshop

The United States Department of the Interior, Bureau of Land Management (BLM), Hollister Field Office (HFO) is preparing a resource management plan (RMP) amendment and associated environmental impact statement (EIS) to guide leasing and management of oil and gas resources on BLM-administered mineral estate within the HFO. The EIS and RMP Amendment will amend the existing 2007 Hollister RMP (BLM, 2007a).

With preparation of a new or amended management plan, the BLM is required to integrate social science information in order to support an informed and sustainable land use planning decision per the Federal Land Policy and Management Act (FLPMA) [43 USC 1712(c)(2); 43 CFR 1610.4-3 and 1610.4-6)] and the National Environmental Policy Act (NEPA) [42 USC 4332(2)(A)]. Applicable social science information can include demography and social indicators, social organization and institutions, attitudes and values, human geography, economic value, employment, income and subsistence, public finance, and government services. The BLM's management plan must also identify any disproportionately high and adverse human health or environmental effects on minority and/or low-income populations, per Executive Order 12898 on Environmental Justice.

In order to develop the social and economic analysis for the EIS and RMP Amendment, the BLM has undertaken a public involvement effort that includes a social and economic workshop. The Social and Economic Workshop (Workshop) was held on February 4, 2015. The purpose of the Workshop was to provide an opportunity for local government officials, community leaders, and other citizens to discuss regional economic conditions, trends, and strategies with BLM managers and staff.

The Workshop was held in Monterey County, which is one of 12 counties that are located in the HFO boundary. This location was selected due to the large number of split estate lease areas in southern Monterey County (i.e., subsurface federal minerals underlying privately-owned land), which will be affected by the EIS and RMP Amendment.

1.2 Workshop Materials and Supporting Documents

Workshop participants received handouts and presentation materials to facilitate the discussion of social and economic issues. All Workshop-related documents are included in the following appendices:

Appendix A: Workshop Notification Materials

- Workshop Invitation and List of Invitees
- BLM News Release

Appendix B: Workshop Handouts

- Sign-In Sheet
- Agenda
- Workshop Summary Handout
- County Fact Sheets
- Presentation Slides for BLM Introduction/Overview

Appendix C: Written Comments

- Written Comments Submitted by Participant
- Written Comments Submitted by the Monterey County Farm Bureau

SECTION 2
OUTREACH AND NOTIFICATION FOR WORKSHOP

2.1 Notification

In December 2014, the BLM mailed the Workshop invitation to 47 individuals and/or agencies and provided the following date and venue information:

Wednesday, February 4, 2015
1:00 pm to 4:00 pm
Carpenter's Hall
910 Second Avenue
Marina, CA

On January 20, 2015, BLM posted a news release to its website for the California Oil and Gas Planning Effort and Science Review (http://www.blm.gov/ca/st/en/prog/energy/og/ogeis.html). The news release announced the scheduled Workshop, provided participant information, and explained the purpose and intent of the Workshop.

2.2 Correspondence with Interested Parties

Prior to the February 4th Workshop, the BLM corresponded with interested parties who had inquiries specific to the Workshop. This communication is documented below in Table 1.

Table 1. Inquiries from Interested Parties prior to the Workshop

Name	Organization	Correspondence Date & Method	Attended Workshop?
TaNeashia Sudds, Executive Administrative Assistant	Earth Economics	1/5/2015 via email	No
Jason McCormick, Journalist	Benito Link	1/14/2015 via phone	No
Andrea Weber, Climate Law Institute Paralegal	Center for Biological Diversity	1/20/2015 via email	No
Daniel Padilla, Regulatory Advisor Sr.	California Resources Corporation	1/27/2015 via email	Yes

2.3 Workshop Attendees

In addition to BLM HFO staff, 11 participants attended the February 4th Workshop, which included local agency representatives, oil and gas industry representatives, and members of the general public. Table 2 lists the Workshop participants.

Table 2. Social and Economic Workshop Participants	
Name	**Organization**
George Armstrong	BLM Resource Advisory Council
Mary Gorden	BLM Resource Advisory Council
Reb Monaco	BLM Resource Advisory Council
Daniel Padilla	California Resources Corporation
John Eade	Humboldt West Inc.
Aaron Johnson	L+G Attorneys at Law
Mike Novo	Monterey County Resource Management Agency
Grace Bogdan	Monterey County Resource Management Agency
Carmel de Bertaut	San Benito Rising
Jennifer Pitcher	Western States Petroleum Association
Ann Clarke	Not Applicable

SECTION 3
WORKSHOP PRESENTATIONS

3.1 Introduction/Overview

The Workshop attendees were welcomed by the BLM Hollister Field Office Manager, Rick Cooper, who provided an overview of the BLM's proposal to amend the RMP for the HFO. The RMP is the primary tool that guides the BLM's management activities, and is created and modified only through an EIS. The EIS serves to identify potential impacts that may result from the proposed RMP Amendment, and is required to analyze a variety of alternatives to the proposed amendment.

Rick Cooper described that the purpose of the proposed RMP Amendment is to guide management of oil and gas resources on lands with federal mineral estate within the jurisdictional boundaries of the HFO. The proposed RMP Amendment would only apply to the BLM's decision-making authority to lease federal mineral estate. The RMP Amendment would be used by BLM to determine which BLM-managed lands or subsurface federal minerals are open or closed to oil and gas leasing, and which stipulations or restrictions apply to protect specific resources. The RMP Amendment would not authorize any actual drilling for exploration or development of oil and gas resources.

3.2 Purpose/Intent of Workshop

Negar Vahidi (Aspen Environmental Group) introduced the Workshop format to the attendees and explained the purpose and desired input from Workshop participants. For all new RMPs, RMP revisions, and RMP amendments, the BLM conducts a public involvement effort that includes at least one economic strategies workshop. The purpose of the workshop is to provide a meaningful opportunity for public input on the effects of the proposed RMP Amendment on local economic and social goals, with the intent of engaging local government officials, community leaders, tribes, and other interested parties in the discussion of desired economic and social conditions in the planning area. Guidance for the public involvement process, including the economic strategies workshop, is detailed in the BLM Land Use Planning Handbook, Appendix D (BLM, 2005).

The economic strategies workshop must meet three objectives:

- Provide information on local and regional economic and social conditions and trends;
- Assist the community to identify desired economic and social conditions; and
- Identify ways to advance local economic and social goals through BLM's planning and policy decisions.

3.2.1 Workshop Handouts

Negar Vahidi briefly discussed the workshop handouts and their content, and provided a brief overview of the HFO area's social and economic statistics. The Workshop participants received a series of county fact sheets that provided a snapshot of the current demographics, socioeconomics, economy, and the oil and gas industry for each of the 12 counties. Participants also received a Workshop Summary Handout that summarized the typical oil and gas decisions made in an RMP, the role of the EIS, and the purpose of the Workshop. The handout included a series of questions for Workshop participants to encourage discussion on the social and economic conditions and potential effects of the proposed RMP Amendment. This discussion is summarized in Section 4.1.

SECTION 4
OUTCOMES OF SOCIAL AND ECONOMIC WORKSHOP

4.1 Summary of Group Discussion

The Workshop attendees participated in a round-table discussion that was facilitated by staff from Aspen Environmental Group and was guided by the discussion topics listed in the Workshop Summary Handout. The discussion focused on the following themes, which are summarized in Sections 4.1.1 through 4.1.4:

- BLM actions under the RMP Amendment;
- Economic and social conditions within the HFO;
- Local community and group values;
- Low-income and/or minority populations; and
- Suggested mitigation strategies and other considerations within the EIS and RMP Amendment.

4.1.1 BLM Actions under the RMP Amendment

Workshop participants inquired into the type of outreach that BLM has undertaken with operators, whether operators have been asked to provide BLM with projections on oil and gas development, and whether these projections differ from BLM's estimates. Participants also pointed out that BLM should maintain consistency in its interactions with, and requirements for, oil and gas developers. The BLM explained that each Field Office must develop its own approach with RMP amendments in regard to whether or not to lease or close specific federal mineral estate. For example, the HFO will coordinate with the Bakersfield Field Office regarding the guidance and stipulations for oil and gas development that was incorporated into the Bakersfield Approved RMP (BLM, 2014). However, BLM emphasized that the HFO RMP Amendment will be specific to the affected resources within the HFO boundary.

4.1.2 Economic and Social Conditions

Split Estate Leases. Much of the Workshop discussion centered on the issue of split estate leases, which define leases where subsurface resources are publically held and managed by the BLM and surface lands are privately owned and managed by the local jurisdiction. In these situations, mineral rights are considered the dominant estate, meaning the owner of the mineral estate has the right to enter and occupy as much of the surface as is reasonably necessary to explore, drill, and remove the oil and natural gas resource on the leasehold, subject to obtaining the BLM's approval of the drilling and surface use plans (BLM, 2007b). However, the mineral estate owner must conduct operations to minimize adverse effects to surface and subsurface resources and prevent any unnecessary surface disturbance (BLM, 2007b). It was noted that split estate leases are important to local agencies and have both adverse and beneficial impacts to local economies. Workshop participants concluded that the economic analysis for the EIS and RMP Amendment should focus on the issues of limiting, eliminating, and creating new split estate lease areas. The analysis of split estate leases should also consider:

- **Subsurface property rights** – The BLM emphasized that proposed actions under the RMP Amendment would only apply to federal mineral estate underlying federal surface land and privately owned land. The RMP Amendment would not affect subsurface activities regulated by the Division of Oil, Gas and Geothermal Resources. Hollister Field Office Manager Rick Cooper explained that it is BLM's policy to provide notification to surface land owners when split estate lands are nominated for a lease sale.

Consistent with BLM policy, a surface land owner would be contacted prior to the issuance of a drilling permit and would be invited to participate in on-site inspections and meetings with the lessee (BLM, 2007b). Workshop participants discussed the need for adequate financial compensation for loss of surface land uses.

- **Conflicts between mineral rights owners and surface land owners** – Workshop participants suggested that more dialogue is needed regarding the siting of future wells in order to minimize conflicts between the needs of surface land owners and the financial benefits of well permit approvals. It is up to the lessee to negotiate a surface use agreement with the land owner, and BLM requires the lessee to demonstrate that the negotiation is in good faith. The lessee must submit an adequate bond to the BLM to ensure compliance and to cover the costs of complete and timely plugging, reclamation, and restoration. The surface land owner may also seek compensation from the lessee for loss or damages (BLM, 2007b).

  BLM noted that it monitors the coordination efforts of developers with surface land owners. However, when there is a Surface Trust in place, coordination becomes very complicated due to the involvement of multiple parties. In such cases, developers may consider directional drilling in order to consolidate multiple wells on an individual well pad. This technique reduces the footprint of oil and gas activities and can avoid conflicts with land owners by minimizing the amount of affected surface area (BLM, 2013). Furthermore, directional drilling allows siting the well pad away from existing surface land uses (should a more suitable open area be available nearby). The development of a land use regulatory process may also help to reduce future conflicts. Furthermore, participants discussed the economic benefits of split estate leases where surface uses coexist with oil and gas production wells (e.g., wells within grazing lands).

- **Protection Measures** – BLM has standard best management practices (BMPs) to minimize the effects of subsurface drilling. These include road building BMPs that reduce the amount of disturbed area, visual resource BMPs to reduce the visual footprint of development, BMPs to reduce human activity in wildlife habitat, and reclamation BMPs to restore habitat resources during well operations (BLM, 2009). Local jurisdiction participants discussed the importance of these BMPs to be consistent with local plans and policies to preserve recreational opportunities, visual resources, and land use plans.

Effects on Agriculture. Concern was expressed regarding the use of water for well stimulation activities. Representatives from Monterey County requested that the economic analysis for the EIS and RMP Amendment include an evaluation of the potential loss of water for agricultural uses as a result of any well stimulation activities associated with the proposed RMP Amendment, with a particular focus on effects to southern Monterey County. The analysis should also consider the guidance and policies in the *Monterey County General Plan: Agricultural and Winery Corridor Plan* (Monterey County, 2010).

It was noted that the RMP Amendment could seek to further coexisting uses for oil and gas production, such as within agricultural grazing areas. Coexisting uses would increase the lands' economic values.

Regional Economic Effects. BLM and Workshop participants agreed that the focus of the social and economic effects EIS analysis should be on Fresno, San Benito, and Monterey Counties, where existing leases and oil and gas potential exist within the HFO. Specific regional economic concerns that were expressed by various representatives included the following:

- **Monterey County** – The majority of oil and gas-related activities would be located in the southern portion of the county, which is generally characterized by an income level that is less than the county

average. Representatives from Monterey County requested that the EIS and RMP Amendment consider the potential loss of tax revenue should split estate leases be limited or decreased within the county. Currently the county receives substantial tax revenue from oil and gas fields as well as from employees' income taxes. The county recommended that the economic analysis should include information on Monterey County's tax revenue from oil and gas-related activities.

Monterey County requested that the EIS and RMP Amendment consider the potential economic effects to tourism that may result from adverse visual impacts and loss of recreation lands, especially in the county's southern area. The county also requested an analysis of any economic consequences (e.g., emission offset purchases) from air quality impacts, in the event that the North Central Coast Air Basin reaches a status of nonattainment due to emissions from oil and gas development.

- **San Benito County –** In November 2014, San Benito County passed a ban on high-intensity petroleum operations that includes hydraulic fracturing (Measure J). The EIS and RMP Amendment would need to consider the effects of Measure J, especially on property rights and the preclusion of economic development of private property. One constituent asked if there is pressure to expand oil and gas development within the county, and how such an expansion would affect the local economy.

  It was also recommended that the EIS and RMP Amendment consider the results of a San Benito County study that is evaluating the loss of property values from future restrictions of oil and gas development on split estate leases.

Localized Social and Economic Effects. Workshop participants noted that there are other economic costs that may be incurred by local communities as a result of oil and gas development. The EIS and RMP Amendment should consider the following concerns:

- Risk of upset (including but not limited to: well blowout, groundwater contamination, localized oil spills and accidental release of other hazardous fluids from pipes and wells, and the cumulative risk from increased well activity);
- Coordination with emergency responders and the ability of local communities to respond to potential accidents;
- Demand on local public services from increased fire or seismic risks;
- Effect on property values; and
- Possible boom and bust cycles associated with fluctuating oil prices, and the effect on local employment.

Some attendees noted that the EIS should include a localized social and economic analysis, as feasible, for communities most affected within Fresno, San Benito, and Monterey Counties (e.g., southern Monterey County).

4.1.3 Community and Group Values

The Workshop participants discussed the regional focus of the social and economic analysis for the EIS and RMP Amendment given the location of federal mineral estate within the HFO boundary. BLM and participants agreed that future oil and gas development is most likely to occur in the counties of Fresno, San Benito, and Monterey.

Representatives from the counties identified the following community characteristics that should be considered in the social analysis for the EIS and RMP Amendment:

Monterey County

Monterey County is experiencing a growing economy and seeks to maintain a high environmental quality in order to retain a more technical workforce. The county is experiencing growth in both the northern and southern areas, and most of the oil and gas development is located in the southern region that has primarily been an agricultural area. One of the county's goals is to improve the economy in a manner that is modern and attractive to a younger population and has more stratigraphic layers of income (i.e., aside from agriculture). The county is concerned that adverse environmental effects from oil and gas development (e.g., impacts to air quality and water quality) may impact recreation and visual resources, resulting in a less desirable area for recruiting and retaining a young workforce. The county stated future oil and gas leases would need to be well-managed and should carefully consider conflicts with visual resources and existing land uses.

The county identified the following three economic goals and drivers that should be considered in the approach to managing oil and gas development:

- **Agriculture** – Monterey County seeks to balance the economics from new oil and gas development with its agricultural industry. There is particular concern regarding the effects of water use on the local economy. According to county representatives, there has not been a notable increase in water use resulting from current oil and gas development.
- **Tourism** – Potential future areas for oil and gas leasing are located along the travel routes to tourist destinations (e.g., lakes and missions) in southern Monterey County. There will need to be a balance of oil and gas development with surrounding visual resources and other tourist attractions such as winery corridors, as not to adversely impact tourism and its associated revenue.
- **Greenhouse Gas Reduction Mandates** – Monterey County wants to ensure that oil and gas development would not increase local greenhouse gas emissions or place a burden on the local economy to meet reduction mandates and goals.

Carmel Valley

Representatives from the community of Carmel Valley expressed their desire to maintain the area's rural character, and they were concerned about future traffic on Carmel Valley Road from Highway 101 to Highway 1. It was requested that the EIS and RMP Amendment consider the social and economic impacts from oil and gas development on the rural character of this small community and on all of Monterey County.

Other Community Concerns

Additional social and economic concerns from oil and gas development were identified by the attendees as being relevant to many of the affected communities. It was recommended that the EIS and RMP Amendment consider the following:

- Identifying the professional skills that are needed to meet the employment needs of the oil and gas industry. The creation of technical educational facilities was suggested;
- The need for a mix of the types of industry in the local economy (i.e., in addition to agriculture);
- The effects of a transient workforce associated with oil and gas development;
- A policy consistency analysis of local agencies' applicable plans and policies with an increase in oil and gas development (e.g., Monterey County's Fort Ord Redevelopment Plan and the Agricultural and Winery Corridor Plan);
- The proximity of leases to transportation corridors, water sources, and gas pipelines;

- The effects on historic and pre-historic resources; and
- The effects on public health. The BLM noted that the oil and gas industry has developed its policies to be consistent with the requirements of the Office of Spill Prevention and Response. The Office of Spill Prevention and Response is also working on regulations.

4.1.4 Low-Income and/or Minority Populations

The Workshop participants considered the topic of low-income and minority populations in the HFO boundary, and discussed any areas containing such population that would most likely be affected by the RMP Amendment. Monterey County participants mentioned there may be disproportionate effects on vulnerable communities in southern Monterey County, specifically King City and the community of San Ardo. These areas should be specifically evaluated within the EIS. Potential impacts to low-income and minority populations may include the following:

- Increase in water use from oil and gas development may affect communities dependent on agriculture; and
- The creation of jobs in low-income communities may be affected by future oil and gas prices and changes in oil and gas development and leasing.

4.1.5 Other Considerations

Additional EIS Analysis Comments

The BLM emphasized that the scope of the EIS and RMP Amendment is specific to the federal mineral estate within the HFO boundary, which defines the locations of lands available for federal mineral estate leases. The proposed RMP Amendment also addresses changes to well stimulation techniques. When asked if a change in policy regarding oil and gas development required an entire plan amendment, the BLM responded that NEPA and the FLPMA require an EIS and RMP amendment to establish additional stipulations, conditions of approval, BMPs, and to update the reasonably foreseeable development scenario. The BLM sponsored an independent review of oil and gas development, which was prepared by the California Council on Science and Technology and is entitled *Advanced Well Stimulation Technologies in California* (CCST, 2014). The results of the study are being incorporated into the RMP Amendment, as applicable.

In addition to the items discussed throughout the Workshop with respect to the EIS, it was noted that the Social and Economic Effects analysis should consider the following:

- Potential impacts associated with each phase of oil and gas development (e.g., exploration, drilling, production, transport, refining, decommissioning, clean-up); and
- Consider, as feasible, the oil and gas data provided by the Los Angeles County Economic Development Corporation's publication Oil and Gas in California: The Industry and its Economic Contribution in 2012 (LAEDC, 2014).

BLM staff was asked about the Draft EIS schedule and information on future public meetings. At this time, the Draft EIS is expected to be published in fall 2015. Future public meetings are planned, but have not yet been scheduled.

Proposed Mitigation for Consideration within the EIS

During the Workshop discussion, the following mitigation measures were suggested to minimize the impacts associated with the RMP Amendment:

- Creation of public educational materials (e.g., brochures) that explain federal mineral estate leases and that provide information to surface land owners and developers regarding inspections, potential hazards, etc.
- Technical educational opportunities to train a local workforce in the oil and gas industry. Community informational programs could also be developed to educate residents in the area.
- Utilizing BMPs that are detailed in BLM's publication *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as The Gold Book) (BLM, 2007c). The BLM would also incorporate the technical requirements listed in its Onshore Oil and Gas Orders (Order No. 1 through Order No. 7) (BLM, 2012).
- Protection measures for threatened and endangered species that may require No Surface Occupancy stipulations or closures in sensitive areas. BLM noted that off-site mitigation lands that compensate for development in one area can have a positive effect on conserving or enhancing resource values in these other areas.

4.2 Summary of Written Comments

The BLM received a comment letter from a local organization prior to the Workshop, as well as a set of written comments that was submitted by a Workshop participant. These comments are summarized below and included in Appendix C.

4.2.1 Monterey County Farm Bureau

The Monterey County Farm Bureau submitted a letter to BLM on December 30, 2014 stating its support for the use of current oil extraction techniques in Monterey County, including enhanced well stimulation from steam injection. The Farm Bureau described the economic benefits that the oil and gas industry has provided to the local residents in Monterey County, specifically the employment opportunities that have been created in San Ardo, San Lucas, and King City. The Farm Bureau indicated that these communities have large minority populations, and oil and gas development creates local economic benefits.

4.2.2 Submitted Workshop Comments

The BLM received one set of written responses to the Workshop discussion topics. The commenter noted that affected communities are rural and that the local economy includes agricultural tourism and visitors to recreational resources. Potential impacts to community character may include light pollution that would affect stargazing opportunities. Vulnerable populations who may be affected by the RMP Amendment include migrant farm workers and their families. Potential mitigation should include retraining displaced agricultural workers.

SECTION 5
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LAEDC (Los Angeles County Economic Development Corporation). 2014. Oil and Gas in California: The Industry and its Economic Contribution in 2012. [online]: http://laedc.org/wp-content/uploads/2014/04/OG_Contribution_20140418.pdf. Accessed February 13, 2015.

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Appendix A
Workshop Notification Materials

Workshop Invitation and List of Invitees

BLM News Release

Last Name	First Name	Agency/Company	Address	City	State	Zipcode
Rosia	Ashley	Western States Petroleum Association	3763 Howard Hughes Pkwy #310	Las Vegas	NV	89169
Reheis-Boyd	Catherine H.	Western States Petroleum Association	1415 L. Street, Suite 600	Sacramento	CA	95814
Stemler	Kim	Monterey County Vintners & Growers Association	P.O. Box 1793	Monterey	CA	93942
Brown	Christopher	Agriculture and Land-Based Training Association	P.O. Box 6264	Salinas	CA	93912
Norm	Groot	Monterey County Farm Bureau	P.O. Box 1449	Salinas	CA	93902-1449
Wade	Mike	California Farm Water Coalition	6133 Freeport Blvd. 2nd Floor	Sacramento	CA	95822
Gatlin	Billy	California Cattlemen's Association	1221 H Street	Sacramento	CA	95814
Nahabedian	Armen	Citadel Exploration	417 31st Street	Newport Beach	CA	92663
Coombs	Steve	Patriot Resources LLC	1565 Canoas Road	Santa Barbara	CA	93105
Ashley	Joe	Vintage Production California LLC	9600 Ming Avenue, Suite 300	Bakersfield	CA	93311
Bianchi	Richard	San Benito County Farm Bureau	530 San Benito St. STE 201	Hollister	CA	95023
Renz	Allan	San Benito County Cattlemen Association	PO Box 820	Hollister	CA	95023
Yount	Doug	Applied Development Economics	99 Pacific St. #200 J	Monterey	CA	93940
Kerhin	Mike	Sierra Club, Loma Prieta Chapter	3921 East Bayshore Road, Ste 204	Palo Alto	CA	94303
Collins	Kevin	Sierra Club, Ventana Chapter	PO Box 5667	Carmel	CA	93921
White	Amy	LandWatch Monterey County	PO Box 1876	Salinas	CA	93902
Hsia-Corona	Andy	Coalition to Protect San Benito	221 5th St.	Hollister	CA	95023
Baker	David	EarthEconomics	107 N. Tacoma Avenue	Tacoma	WA	98403
Weber	Andrea	Center for Biological Diversity	351 California St., Ste. 600	San Francisco	CA	94104
Mr. Doug Alger		Salinan Nation Cultural Preservation Association	Post Office Box 56	Lockwood	CA	93932
Mr. Ruben Barrios, ATTN: Mr. Lalo Franco		Santa Rosa Rancheria of Tachi Yokuts	16835 Alkali Drive	Lemoore	CA	93245
Mr. John W. Burch		Salinan Tribe of Monterey, San Luis Obispo and San Benito	7070 Morro Road #A	Atascadero	CA	93422
Ms. Silvia Burley		California Valley Miwok Tribe	10601 Escondido Place	Stockton	CA	95212
Ms. Rosemary Cambra		Muwekma Ohlone Tribe	2574 Seaboard Avenue	San Jose	CA	95131
Mr. Gregg Castro		Salinan Nation Cultural Preservation Association	5225 Roeder Road	San Jose	CA	95111
Mr. Tony Cerda		Costanoan Rumsen Carmel Tribe	3929 Riverside Drive	Chino	CA	91710
Mr. Robert Duckworth		Salinan Nation Cultural Preservation Association	Drawer 2447	Greenfield	CA	93927
Mr. Jose Freeman		Salinan Nation Cultural Preservation Association	15200 Country Road 96B	Woodland	CA	95695
Mr. Andrew Galvan			Post Office Box 3152	Mission San Jos	CA	94539
Ms. Ramona Garibay		Trina Marina Ruano Family	6626 Thornton Avenue	Newark	CA	94560
Ms. Judith Bomar Grindstaff			63161 Argyle Road	King City	CA	93930
Ms. Donna Haro		Xolon Salinan Tribe	110 Jefferson Street	Bay Point	CA	94565
Ms. Jakki Kehl			720 North 2nd Street	Patterson	CA	95363
Mr. Richard Larios			1048 San Juan Grade Road	Salinas	CA	93907
Ms. Susan Latta		Salinan Tribe	Post Office Box 817	Gonzales	CA	93926
Mr. Valentin Lopez		Amah Mutsun Tribal Band	78 Sunshine Drive	Galt	CA	95632
Ms. Shirley Macagni		Salinan Tribe of Monterey, San Luis Obispo and San Benito	1550 Guadalupe Road	Nipomo	CA	93444
Mr. Michael A. Martinez		Salian Tribe	384 Nash Road #29	Hollister	CA	95023
Mr. Tom Little Bear Nason		Esselen Tribe of Monterey County	38855 Tassajara Road	Carmel Valley	CA	93924
Mr. Patrick Orozco		Pajaro Valley Ohlone Indian Council	644 Peartree Drive	Watsonville	CA	95076
Ms. Katherine Erolinda Perez			1234 Luna Lane	Stockton	CA	95208
Ms. Bonnie Pierce		Salinan Tribe of Monterey, San Luis Obispo and San Benito	440 Highland Drive	Los Osos	CA	93402
Ms. Louise Ramirez		Ohlone-Costanoan Essien Nation	Post Office Box 1301	Monterey	CA	93942
Ms. Ann Marie Sayers		Indian Canyon	Post Office Box 28	Hollister	CA	95023
Xielolidi		Salinan-Chumash Nation	3901 Q Street, Suite 31B	Bakersfield	CA	93301
Ms. Linda Yamane			1585 Mira Mar Avenue	Seaside	CA	93955
Ms. Irene Zwierlein		Amah Mutsun Ohlone	789 Canada Road	Woodside	CA	94062

Hesson	Bruce	CA Division of Oil and Gas and Geothermal Resources	195 S. Broadway, Suite 101	Orcutt	CA	93455
Wermiel	Dan	CA Division of Oil and Gas and Geothermal Resources	466 N. Fifth St.	Coalinga	CA	93210
Turner	Byron	San Benito County	2301 Technology Parkway	Hollister	CA	95023
Novo	Mike	County of Monterey Resource Management Agency	168 W. Alisal St, 2nd Floor	Salinas	CA	93901
Fritas	Angela	Stanislaus County	1010 10th St, Ste 3400, 3rd Floor	Modesto	CA	95354
Hendrickson	Mark J.	Merced County	2222 M St.	Merced	CA	95340
Sullivan	Kerry	San Joaquin County Community Development Department	180 E. Hazelton Ave.	Stockton	CA	95205
Lopez	Albert	Alameda Planning Department	224 West Winton Ave. Room 111	Hayward	CA	94544
Li	Hillana	Contra Costa County Planning Commission	30 Muir Rd	Martinez	CA	94553
Girard	Kirk	Santa Clara County	70 West Herring Street, East Wing, 7th Floor	San Jose	CA	95110
McKenzie	Andrea	Santa Clara Valley Open Space Authority	6980 Santa Teresa Boulevard #100	San Jose	CA	95119
Eggemeyer	Jim	County of San Mateo	Center, 2nd Floor	Redwood City	CA	94063
Muenzer	Jerry	Board of Supervisors, San Benito County	481 4th St. 1st Floor	Hollister	CA	95023
Rivas	Robert	Board of Supervisors, San Benito County	481 4th St. 1st Floor	Hollister	CA	95023
Salinas	Simon	Board of Supervisors, County of Monterey	168 W. Alisal, 3rd Floor	Salinas	CA	93901
Parker	Jane	Board of Supervisors, County of Monterey	2616 1st Ave.	Marina	CA	93933
Judy Case McNairy		Board of Supervisors, Fresno County	2281 Tulare St. Room #300	Fresno	CA	93721
Don Horsley		Board of Supervisors, San Mateo County	Hall of Justice - 400 County Center	Redwood City	CA	94063
Joe Simitian		Board of Supervisors, Santa Clara County	County Govt. Center - 10th Floor-East Wing - 70 W. Hedding St.	San Jose	CA	95110
Dave Cortese		Board of Supervisors, Santa Clara County	County Govt. Center - 10th Floor-East Wing - 70 W. Hedding St.	San Jose	CA	95110
Jim De Martini		Board of Supervisors, Stanislaus County	1010 10th St., Ste. 6500	Modesto	CA	95354
Knox	Blair	CIPA	1112 I St. #350			95814
Rosenlieb	Trent		5500 Lennox Unit 1	Bakersfield	CA	93309
Twisselman	Carl		9501 West Lokern Road	McKittrick	CA	93251
Gorden	Mary		P.O. Box 44066	Lemon Cove	CA	93244-0066
Cattani	Emmy		5100 California Ave #234	Bakersfield	CA	93309
Monaco	Reb		6991 Southside Road	Hollister	CA	95023
Evans	Steve		1853 Third Ave.	Sacramento	CA	95818
Armstrong	George		2151 San Miguel Drive	Walnut Creek	CA	94596
Miller	Sally		PO Box 22	Lee Vining	CA	93541
Kingsley	Matt		210 Lasky Lane	Lone Pine	CA	93545
Keller	Jim		100 Mountain Springs Drive	Bonny Doon	CA	95060
		Oakland Metropolitan Chamber of Commerce	475 14th St.	Oakland	CA	94612
		San Jose Silicon Valley Chamber of Commerce	101 W. Santa Clara St.	San Jose	CA	95113
		Santa Cruz Area Chamber of Commerce	725 Front Street	Santa Cruz	CA	95060
		Modesto Chamber of Commerce	1114 J Street	Modesto	CA	95354
		San Benito County Chamber of Commerce	243 Sixth Street, Suite 100	Hollister	CA	95023
		Greater Stockton Chamber of Commerce	445 W. Weber Ave., Suite 220	Stockton	CA	95203
		The Greater Merced Chamber of Commerce	1640 N Street, Suite #120	Merced	CA	95320
		Fresno Chamber of Commerce	2331 Fresno St.	Fresno	CA	93721
		Coalinga Area Chamber of Commerce	380 Coalinga Plaza	Coalinga	CA	93210
		Salinas Valley Chamber of Commerce	119 E. Alisal St.	Salinas	CA	93901
Paulsen	Scott	Alameda County Agriculture Commissioner	224 W. Winton Ave., Rm. 184	Hayward	CA	94544
Deviney	Joseph	Santa Clara County Agriculture Commissioner	1553 Berger Dr., Bldg. I	San Jose	CA	95112
Nicoletti	Mary Lou	Santa Cruz County Agriculture Commissioner	175 Westridge Dr.	Watsonville	CA	95076
O'Haire	Milton	Stanislaus County Agriculture Commissioner	3800 Cornucopia Way, Ste. B	Modesto	CA	95358
Ross	Ron	San Benito County Agriculture Commissioner	P.O. Box 699	Hollister	CA	95024
Pelican	Tim	San Joaquin County Agriculture Commissioner	2101 East Earhart Ave., Suite 100	Stockton	CA	95206
Robinson	David	Merced County Agriculture Commissioner	2139 Wardrobe Ave.	Merced	CA	95341
Wright	Les	Fresno County Agriculture Commissioner	1730 S. Maple Ave.	Fresno	CA	93702
Godoy	Chad	Contra Costa County Agriculture Commissioner	2366 A. Stanwell Circle	Concord	CA	94520
Lauritzen	Eric	County of Monterey Agriculture Commissioner	1428 Abbott St.	Salinas	CA	93901
Crowder	Fred	County of San Mateo Agriculture Commissioner	P.O. Box 999	Redwood City	CA	94064

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Hollister Field Office
20 Hamilton Court
Hollister, CA 95023
Phone (831) 630-5000 Fax (831) 630-5055
http://www.blm.gov/ca/hollister

December 22, 2014

In Reply Refer to:
1600 (P)
CAC090.38

Dear Sir or Madam,

The Bureau of Land Management (BLM) invites you to attend a Social and Economic Workshop to discuss social and economic issues associated with enhanced well stimulation for oil and gas production on federal minerals administered by the BLM's Hollister Field Office (ref. inserted map). The workshop will be held from 1:00 pm - 4:00 p.m. on Wednesday, February 4, 2015 at the Carpenter's Hall, 910 Second Ave. Marina, CA.

You have received this invitation because we are seeking direct input and knowledge from local businesses, organizations, associations, government agencies, elected officials, and other stakeholders. The goal of the workshop is to gather information to be included in an environmental impact statement to analyze the social and economic impacts of oil and gas leasing alternatives to be considered in the Hollister Oil and Gas Draft Resource Management Plan Amendment.

We hope that you or a representative can participate at this important stage in the planning process. Participants will have the opportunity to discuss social and economic conditions and suggest ways for the BLM and its socioeconomic contractor, Aspen Environmental Group, to improve the social and economic analyses. Please let us know if you'd like to attend and we can provide more background information and details about the workshop.

If you cannot attend, we encourage a written response that identifies: (1) how communities and groups within the region are affected by oil and gas production, including low-income and minority populations, and (2) opportunities to advance local economic and social goals through planning decisions within the authority of the BLM, its cooperating agencies, or other partners.

For more information please contact Ms. Negar Vahidi, Aspen Environmental Group, Social Sciences Task Leader, nvahidi@aspeneg.com, (310) 387-6807. BLM specialists are also available to answer questions before the workshop; please contact Sky Murphy, Planning & Environmental Coordinator, (831) 630-5039.

Thank you for your interest, and we hope to see you at the workshop!

Sincerely,

Rick Cooper

Rick Cooper, Field Office Manager

U.S. Department of the Interior
Bureau of Land Management

News Release

For Immediate Release: Jan. 20, 2015 CA-CC-15-10

Contact: David Christy, (916) 941-3146 dchristy@blm.gov

BLM Holds Socio-Economic Workshop in Marina

MARINA, Calif. - The Bureau of Land Management (BLM) will hold a workshop Feb. 4 in Marina to gather information on social and economic issues associated with enhanced well stimulation for oil and gas production on federal mineral resources administered by the BLM's Hollister Field Office.

The BLM is seeking input on social and economic issues to be included in an Environmental Impact Statement for the Hollister Oil and Gas Draft Resource Management Plan Amendment. The plan amendment will incorporate new information about well stimulation technologies, natural resource conditions, and socioeconomic trends. The information also will be used to update the reasonably foreseeable development scenario for oil and gas.

The public workshop will run from 1 p.m. to 4 p.m. at Carpenter's Hall, 910 Second Ave.

For more information contact Melinda Moffitt at (916) 978-4557 or BLM_CA_OGEIS@blm.gov. Information also is available on the BLM website at www.blm.gov/ca/eis-og.

-BLM-

APPENDIX B
WORKSHOP HANDOUTS

Sign-In Sheet

Agenda

Workshop Summary Handout

County Fact Sheets

Presentation Slides for BLM Introduction/Overview



News Release

Sign-In Sheet – February 4, 2015, 1 p.m. to 4 p.m.

Social and Economic Workshop for Hollister Oil and Gas Project EIS/RMP Amendment

Please print or write legibly. Thank you.

Name	CARMEL de BERTAUT	**Organization**	SAN BENITO RISING
Address	PO BOX 1135		
Email	carmeledebertaut@gmail.com	**Phone**	408 891 7647
Name	Mary Gorder	**Organization**	RAC
Address	PO Box 44066		
Email	magorden@msn.com	**Phone**	559-597-2373
Name	Reb Monaco	**Organization**	RAC
Address	6991 Southside Rd. Hollister, CA 95023		
Email	—	**Phone**	831-637-1445
Name	Ann Clarke	**Organization**	
Address	P.O. Box 556 Carmel Valley, CA 93924		
Email	annclarke1000@gmail.com	**Phone**	831-298-7417
Name	Daniel I. Padilla	**Organization**	California Resources Corp
Address	10800 Stockdale Hwy		
Email	Daniel.padilla@crc.com	**City**	Bakersfield, CA 93311
Name	Mike Novo	**Organization**	Mont County RMA-Planning
Address	168 W. Alisal, 2nd Floor Salinas		
Email	novom@co.monterey.ca.us	**Phone**	831 755-5192
Name	Grace Bogdan	**Organization**	Mont Co. RMA-Planning
Address	Same as above		
Email	Bogdang@co.monterey.ca.us	**Phone**	
Name	Aaron Johnson	**Organization**	LT & Attorneys
Address	Aaron@LT-Attorneys.com		318 Cayuga St Salinas CA 93901
Email		**Phone**	831-754-2444
Name	GEORGE ARMSTRONG	**Organization**	BLM RAC
Address	2111 SAN MIGUEL HOLLISTER CA 95023		
Email		**Phone**	925 788 5994

** Your name, address, and comments become public information and may be released to interested parties if requested.*

Sign-In Sheet – February 4, 2015, 1 p.m. to 4 p.m.

Social and Economic Workshop for Hollister Oil and Gas Project EIS/RMP Amendment

Please print or write legibly. Thank you.

Name Jennifer Pitcher	**Organization** USPA
Address 901 Tower Way #300 Bakersfield CA 93309	
Email jpitcher@uspa.org	**Phone** (661) 321-0884
Name John Eade	**Organization** Humboldt Weir Inc.
Address 4760 Santa Ana Valley Rd.	
Email johneade@garlic.com	**Phone** 831-245-7341
Name	**Organization**
Address	
Email	**Phone**
Name	**Organization**
Address	
Email	**Phone**
Name	**Organization**
Address	
Email	**City**
Name	**Organization**
Address	
Email	**Phone**
Name	**Organization**
Address	
Email	**Phone**
Name	**Organization**
Address	
Email	**Phone**

** Your name, address, and comments become public information and may be released to interested parties if requested.*

HOLLISTER OIL AND GAS PROJECT EIS/RMP AMENDMENT
SOCIAL AND ECONOMIC WORKSHOP
AGENDA
WEDNESDAY, FEBRUARY 4, 2015; 1:00 – 4:00 PM

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1. Introduction – Rick Cooper, Hollister Field Office Manager

2. Workshop Objectives – Negar Vahidi, Aspen Environmental Group
   - Workshop Format/Intent
   - Regional Social and Economic Facts/Statistics

3. Questions or Comments?

4. Break (10 minutes)

5. Group Discussion(s)
   - Topic 1
   - Topic 2
   - Topic 3
   - Topic 4
   - Topic 5

6. Questions or Comments?

Hollister Field Office Oil & Gas Leasing and Development

US Department of the Interior
Bureau of Land Management - California

February 2014

Social and Economic Workshop

The United States (US) Department of the Interior, Bureau of Land Management (BLM), Hollister Field Office (HFO) is preparing a resource management plan (RMP) amendment and associated environmental impact statement (EIS) to guide management of oil and gas resources on lands with federal mineral estate within the HFO. The RMP provides land management direction for the BLM.

The EIS/RMP Amendment will incorporate new information about well stimulation technologies and reasonably foreseeable development of federal minerals to analyze the effects of alternative management strategies on the environment, including socioeconomic impacts.



What kinds of decisions are made about oil and gas in an RMP?

- RMPs identify lands as being open or closed to oil and gas leasing.
- RMPs identify stipulations, or restrictions, that are applied to federal mineral leases in the planning area. Stipulations restrict the locations, types of activities allowed, and/or seasons of allowed activity on a certain piece of land.

What will the EIS evaluate?

- Current or reasonably foreseeable well completion and stimulation practices, including hydraulic fracturing and the use of horizontal drilling, in the HFO.
- Potential effects on the social values and economics of affected communities from oil and gas leasing and development, including well stimulation activities.
- Measures to help avoid or reduce negative socioeconomic effects.

What is the purpose of the economic strategies workshop?

- To engage local government officials, community leaders, tribes, and other interested parties in the discussion of desired economic and social conditions in the planning area.
- To provide a meaningful opportunity for public input on the effects the proposed RMP Amendment may have on local economic and social goals. Due to the diverse economic and socioeconomic areas within the HFO boundary, BLM staff and contractors are seeking localized input for the RMP Amendment socioeconomic analysis.

Discussion Topics

The following questions are designed for all workshop participants to identify social and economic conditions and potential effects of the proposed RMP Amendment. Feedback from the workshop will be incorporated into the EIS to help readers understand how public land resources are integrated into the local economy and way of life within the HFO.

1. What are the local economic goals and priorities in your region?

    a. Are they affected by local, regional, or global demand for oil and the price/barrel?

    b. Are they likely to be affected by development of federal minerals in the Hollister Field Office?

    c. Have local businesses seen a change in activity/revenue or employment levels related to oil and gas production?

2. Who is affected by oil and gas production in your geographic areas, and in what ways?

    a. If different groups are unequally affected, describe and explain why.

    b. Are there any pockets with vulnerable populations in the area?

3. Identify existing community values that are potentially affected from the leasing and development of federal minerals in the HFO.

4. What strategies should BLM consider to promote safe and responsible oil and gas development?

5. Are there mitigation measures (e.g., constraints on site-specific activities) that could help offset the potential social and economic effects of BLM's land use planning decisions?

Social and Economic Workshop

Fact Sheets for counties within the Hollister Field Office boundary:

- Alameda
- Contra Costa
- Fresno
- Merced
- Monterey
- San Benito
- San Francisco
- San Joaquin
- San Mateo
- Santa Clara
- Santa Cruz
- Stanislaus

Alameda County

Demographic and Socioeconomic Statistics	
Population and Projections	1,573,254 (in 2014) 1,682,348 (in 2020) 1,835,340 (in 2030) 1,978,656 (in 2040) 2,115,824 (in 2050) 2,195,999 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 65.9% • Population Below Poverty Level: 12.0%
Housing Units	588,948 (2.78 persons per household)
Vacant Units (Vacancy Rate)	37,798 (6.4%)
Median Home Price	$485,000 (in 2013)
Median Household Income	$69,151
Economic Indicators	
Regional Economy Overview	• Alameda County is located on the eastern shore of the San Francisco Bay. Its largest city is Oakland, and it is home to the Port of Oakland, the fourth busiest container port in the United States. • Salaries are forecasted to rise an average of 1.5% per year from 2014 to 2019, and are expected to remain above the state average for the foreseeable future. Employment growth is forecasted to be strong over the medium term but slow over the longer term.
Unemployment and Expected Growth	• Unemployment Rate: 5.7% • Expected Job Growth (2014-2019): 7.9% • Expected Personal Income Growth (2014-2019): 15.7% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $57,595 (ranked 9th in CA) • Average Salary Per Worker: $79,614
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 20 (8 are active) Total Oil and Gas Wells: 93 (none located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 135 (<0.1% of total county employment) • Average Annual Wage: $94,191 (47.8% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 68,122 in 2001 (<0.1% of total county labor earnings) • 44,950 in 2012 (<0.1% of total county labor earnings)

Contra Costa County

Demographic and Socioeconomic Statistics	
Population and Projections	1,087,008 (in 2014) 1,166,670 (in 2020) 1,281,561 (in 2030) 1,400,999 (in 2040) 1,512,940 (in 2050) 1,620,604 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 52.2% • Population Below Poverty Level: 10.2%
Housing Units	405,828 (2.83 persons per household)
Vacant Units (Vacancy Rate)	25,266 (6.2%)
Median Home Price	$392,500 (in 2013)
Median Household Income	$74,815
Economic Indicators	
Regional Economy Overview	• Contra Costa County is located on the eastern edge of the San Francisco Bay. The west and central county areas are primarily urban (residential, commercial, industrial) while the east county area is primarily agriculture and open space. Oil refineries are located in the northern central county area. • Salaries are forecasted to rise an average of 1.7% per year from 2014 to 2019, and are expected to remain above the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 6.1% • Expected Job Growth (2014-2019): 8.4% • Expected Personal Income Growth (2014-2019): 16.0% • Fastest Growing Job Sector: Information
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $65,106 (ranked 5th in CA) • Average Salary Per Worker: $77,456
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 18 (4 are active) Total Oil and Gas Wells: 663 (2 located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 1,073 (0.3% of total county employment) • Average Annual Wage: $220,106 (265.9% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 539,630 in 2001 (1.7% of total county labor earnings) • 694,153 in 2012 (2.2% of total county labor earnings)

Fresno County

Demographic and Socioeconomic Statistics	
Population and Projections	964,040 (in 2014) 1,055,106 (in 2020) 1,200,666 (in 2030) 1,332,913 (in 2040) 1,464,413 (in 2050) 1,587,852 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 67.3% • Population Below Poverty Level: 24.8%
Housing Units	322,489 (3.2 persons per household)
Vacant Units (Vacancy Rate)	26,633 (8.3%)
Median Home Price	$152,500 (in 2013)
Median Household Income	$43,756
Economic Indicators	
Regional Economy Overview	• Fresno County is located in the San Joaquin Valley and is the most productive agricultural county in the nation. The primary commodity is grapes, followed by almonds, poultry, milk, and tomatoes. • Salaries are forecasted to rise an average of 1.2% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 12.1% • Expected Job Growth (2014-2019): 10.7% • Expected Personal Income Growth (2014-2019): 16.3% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $34,864 (ranked 44th in CA) • Average Salary Per Worker: $48,198
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 28 (13 are active) Total Oil and Gas Wells: 11,550 (35 located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 208 (0.1% of total county employment) • Average Annual Wage: $83,449 (120.1% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 22,062 in 2001 (0.1% of total county labor earnings) • 38,319 in 2012 (0.2% of total county labor earnings)

Merced County

Demographic and Socioeconomic Statistics	
Population and Projections	264,922 (in 2014) 288,991 (in 2020) 337,798 (in 2030) 389,934 (in 2040) 439,075 (in 2050) 485,712 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 68.2% • Population Below Poverty Level: 24.6%
Housing Units	84,298 (3.39 persons per household)
Vacant Units (Vacancy Rate)	8,108 (9.6%)
Median Home Price	$148,000 (in 2013)
Median Household Income	$42,741
Economic Indicators	
Regional Economy Overview	• Merced County is located in the San Joaquin Valley and its economy is centered on farm crop production and agricultural processing. The county's primary agricultural commodity is milk. • Salaries are forecasted to rise an average of 1.5% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 14.3% • Expected Job Growth (2014-2019): 7.7% • Expected Personal Income Growth (2014-2019): 16.0% • Fastest Growing Job Sector: Construction
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $31,293 (ranked 56th in CA) • Average Salary Per Worker: $45,813
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 55 (18 are active) Total Oil and Gas Wells: 195 (none located on BLM lands) **Mining Employment (including fossil fuels):** • 57 jobs in 2001 (0.1% of total county employment) • 144 jobs in 2011 (0.2% of total county employment) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 1,691 in 2001 (<0.1% of total county labor earnings) • 9,789 in 2012 (0.2% of total county labor earnings)

Monterey County

Demographic and Socioeconomic Statistics	
Population and Projections	425,756 (in 2014) 446,258 (in 2020) 476,874 (in 2030) 500,194 (in 2040) 520,362 (in 2050) 533,575 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 67.0% • Population Below Poverty Level: 16.1%
Housing Units	138,817 (3.23 persons per household)
Vacant Units (Vacancy Rate)	13,128 (9.5%)
Median Home Price	$356,250 (in 2013)
Median Household Income	$54,341
Economic Indicators	
Regional Economy Overview	• Monterey County is located on the central coast and its economy is centered on agriculture. The county's primary crops are lettuce and strawberries. • Salaries are forecasted to rise an average of 0.4% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 9.3% • Expected Job Growth (2014-2019): 6.3% • Expected Personal Income Growth (2014-2019): 13.5% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $46,224 (ranked 24th in CA) • Average Salary Per Worker: $54,301
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 28 (13 are active) Total Oil and Gas Wells: 3,596 (14 located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 203 (0.1% of total county employment) • Average Annual Wage: $92,476 (123.6% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 28,062 in 2001 (0.2% of total county labor earnings) • 39,418 in 2012 (0.3% of total county labor earnings)

San Benito County

Demographic and Socioeconomic Statistics	
Population and Projections	57,517 (in 2014) 63,418 (in 2020) 73,459 (in 2030) 82,969 (in 2040) 90,802 (in 2050) 99,215 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 62.0% • Population Below Poverty Level: 12.7%
Housing Units	18,130 (3.35 persons per household)
Vacant Units (Vacancy Rate)	1,079 (6.0%)
Median Home Price	$355,000 (in 2013)
Median Household Income	$63,613
Economic Indicators	
Regional Economy Overview	• San Benito County is located in the Coast Range Mountains of Central California. Compared with the rest of the state, it has the highest rate of workers who commute to other counties, primarily to Santa Clara County. • Salaries are forecasted to rise an average of 1.5% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 10.8% • Expected Job Growth (2014-2019): 7.4% • Expected Personal Income Growth (2014-2019): 15.3% • Fastest Growing Job Sector: Information
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $39,422 (ranked 37th in CA) • Average Salary Per Worker: $49,593
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 21 (11 are active) Total Oil and Gas Wells: 388 (56 located on BLM lands) **Mining Employment (including fossil fuels):** • 241 jobs in 1970 (3.0% of total county employment) • 106 jobs in 2000 (0.5% of total county employment) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 12,733 in 1970 (3.8% of total county labor earnings) • 7,216 in 2000 (0.7% of total county labor earnings)

San Francisco County

Demographic and Socioeconomic Statistics	
Population and Projections	836,620 (in 2014) 891,493 (in 2020) 967,405 (in 2030) 1,027,004 (in 2040) 1,081,540 (in 2050) 1,103,174 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 58.2% • Population Below Poverty Level: 13.2%
Housing Units	381,143 (2.32 persons per household)
Vacant Units (Vacancy Rate)	31,405 (8.2%)
Median Home Price	$830,000 (in 2013)
Median Household Income	$72,020
Economic Indicators	
Regional Economy Overview	• San Francisco County is located north of San Mateo County on a peninsula between the San Francisco Bay and the Pacific Ocean. The highest concentration of future job growth is anticipated to be within the downtown and northeastern waterfront areas of the county. • Salaries are forecasted to rise an average of 1.9% per year from 2014 to 2019, and are expected to remain above the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 4.4% • Expected Job Growth (2014-2019): 8.4% • Expected Personal Income Growth (2014-2019): 19.2% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $86,588 (ranked 2nd in CA) • Average Salary Per Worker: $107,171
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 5 (3 are active) Total Oil and Gas Wells: none **Mining Employment (including fossil fuels):** • Number of Jobs: 54 (<0.1% of total county employment) • Average Annual Wage: $126,335 (51.3% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 30,530 in 2001 (<0.1% of total county labor earnings) • 58,051 in 2012 (0.1% of total county labor earnings)

San Joaquin County

Demographic and Socioeconomic Statistics	
Population and Projections	710,731 (in 2014) 766,644 (in 2020) 893,354 (in 2030) 1,037,761 (in 2040) 1,171,439 (in 2050) 1,306,271 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 64.1% • Population Below Poverty Level: 17.5%
Housing Units	236,943 (3.2 persons per household)
Vacant Units (Vacancy Rate)	18,987 (8.0%)
Median Home Price	$215,000 (in 2013)
Median Household Income	$50,168
Economic Indicators	
Regional Economy Overview	• San Joaquin County is located in the northernmost portion of San Joaquin Valley. While the county's economy is largely agricultural, it has a larger concentration of transportation and warehouse jobs than other counties in the valley. • Salaries are forecasted to rise an average of 0.9% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 11.7% • Expected Job Growth (2014-2019): 10.4% • Expected Personal Income Growth (2014-2019): 16.8% • Fastest Growing Job Sector: Construction
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $34,483 (ranked 47th in CA) • Average Salary Per Worker: $51,179
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 46 (11 are active) Total Oil and Gas Wells: 1,225 (none located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 88 (<0.1% of total county employment) • Average Annual Wage: $68,144 (67.2% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 17,092 in 2001 (0.1% of total county labor earnings) • 13,757 in 2012 (0.1% of total county labor earnings)

San Mateo County

Demographic and Socioeconomic Statistics	
Population and Projections	745,193 (in 2014) 777,088 (in 2020) 822,889 (in 2030) 874,626 (in 2040) 925,295 (in 2050) 936,151 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 57.5% • Population Below Poverty Level: 7.4%
Housing Units	273,532 (2.83 persons per household)
Vacant Units (Vacancy Rate)	13,300 (4.9%)
Median Home Price	$742,000 (in 2013)
Median Household Income	$87,601
Economic Indicators	
Regional Economy Overview	• San Mateo County is located on the Bay Area Peninsula, south of San Francisco. Of the top 25 largest software companies in the Bay Area, 13 are headquartered in San Mateo County. • Salaries are forecasted to rise an average of 1.8% per year from 2014 to 2019, and are expected to remain above the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 4.2% • Expected Job Growth (2014-2019): 9.4% • Expected Personal Income Growth (2014-2019): 19.1% • Fastest Growing Job Sector: Information
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $79,021 (ranked 3rd in CA) • Average Salary Per Worker: $94,085
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 5 (3 are active) Total Oil and Gas Wells: 196 (none located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 31 (<0.1% of total county employment) • Average Annual Wage: $82,040 (20.5% below county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 13,342 in 2001 (<0.1% of total county labor earnings) • 16,657 in 2012 (<0.1% of total county labor earnings)

Santa Clara County

Demographic and Socioeconomic Statistics	
Population and Projections	1,868,558 (in 2014) 1,970,828 (in 2020) 2,151,165 (in 2030) 2,331,887 (in 2040) 2,482,347 (in 2050) 2,585,318 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 64.8% • Population Below Poverty Level: 9.7%
Housing Units	644,691 (2.98 persons per household)
Vacant Units (Vacancy Rate)	28,233 (4.4%)
Median Home Price	$645,000 (in 2013)
Median Household Income	$88,478
Economic Indicators	
Regional Economy Overview	• Santa Clara County is the largest county in the Bay Area with respect to population and total employment. Silicon Valley is located in the northwest portion of the county. • Salaries are forecasted to rise an average of 2.5% per year from 2014 to 2019, and are expected to remain above the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 5.3% • Expected Job Growth (2014-2019): 10.0% • Expected Personal Income Growth (2014-2019): 23.3% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $70,772 (ranked 4th in CA) • Average Salary Per Worker: $113,951
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 10 (4 are active) Total Oil and Gas Wells: 112 (none located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 212 (<0.1% of total county employment) • Average Annual Wage: $72,501 (24.6% below county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 57,980 in 2001 (0.1% of total county labor earnings) • 49,651 in 2012 (<0.1% of total county labor earnings)

Santa Cruz County

Demographic and Socioeconomic Statistics	
Population and Projections	271,595 (in 2014) 281,870 (in 2020) 295,538 (in 2030) 303,512 (in 2040) 307,606 (in 2050) 314,875 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 40.2% • Population Below Poverty Level: 14.4%
Housing Units	105,047 (2.73 persons per household)
Vacant Units (Vacancy Rate)	10,174 (9.7%)
Median Home Price	$505,000 (in 2013)
Median Household Income	$63,092
Economic Indicators	
Regional Economy Overview	• Santa Cruz County is located on the central coast and is the 2nd smallest county with respect to size. The top employer for the county is the University of California, Santa Cruz. The county's agricultural region is located in its southeastern region, and the highest valued crops include strawberries and raspberries. • Salaries are forecasted to rise an average of 1.8% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 9.0% • Expected Job Growth (2014-2019): 6.8% • Expected Personal Income Growth (2014-2019): 17.2% • Fastest Growing Job Sector: Construction
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $54,615 (ranked 10th in CA) • Average Salary Per Worker: $52,908
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 8 (4 are active) Total Oil and Gas Wells: 65 (3 located on BLM lands) **Mining Employment (including fossil fuels):** • 140 jobs in 2001 (0.1% of total county employment) • 312 jobs in 2011 (0.2% of total county employment) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 4,763 in 2001 (0.1% of total county labor earnings) • 22,984 in 2012 (0.3% of total county labor earnings)

Stanislaus County

Demographic and Socioeconomic Statistics	
Population and Projections	526,042 (in 2014) 573,794 (in 2020) 648,076 (in 2030) 714,910 (in 2040) 783,005 (in 2050) 856,717 (in 2060)
Minority and Low-Income Population	• Minority Population Percentage: 53.3% • Population Below Poverty Level: 19.2%
Housing Units	180,165 (3.14 persons per household)
Vacant Units (Vacancy Rate)	14,375 (8.0%)
Median Home Price	$175,000 (in 2013)
Median Household Income	$44,053
Economic Indicators	
Regional Economy Overview	• Stanislaus County is located in the San Joaquin Valley. Modesto is the county's largest city and is the site for most of the county's population and employment. The local economy is centered on agriculture, and the primary commodities include milk, almonds, and chickens. • Salaries are forecasted to rise an average of 1.1% per year from 2014 to 2019. Average salaries will remain below the state average for the foreseeable future.
Unemployment and Expected Growth	• Unemployment Rate: 12.3% • Expected Job Growth (2014-2019): 9.0% • Expected Personal Income Growth (2014-2019): 16.3% • Fastest Growing Job Sector: Professional Services
Per Capita Personal Income and Average Salary Per Worker	• Per Capita Income: $35,434 (ranked 45th in CA) • Average Salary Per Worker: $50,993
Industry snapshot of the mining, quarrying, and oil and gas industry	Total Mines: 27 (7 are active) Total Oil and Gas Wells: 146 (none located on BLM lands) **Mining Employment (including fossil fuels):** • Number of Jobs: 32 (<0.1% of total county employment) • Average Annual Wage: $51,826 (27.6% above county average) **Mining Labor Earning Trends (including fossil fuels) in thousands $:** • 3,668 in 2001 (<0.1% of total county labor earnings) • 3,181 in 2012 (<0.1% of total county labor earnings)

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U.S. Bureau of Land Management

Hollister Field Office

Oil and Gas Leasing and Development

Social & Economic Workshop

February 4, 2015

BLM Overview

- The BLM is the federal agency that has the delegated authority to manage public lands and all onshore federal mineral estate on behalf of the American people.

- The BLM's multiple-use mission is:
  "*…to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations.*"

Hollister Field Office



Contra Costa County

San Joaquin County

SF County

Alameda County

Stanislaus County

San Mateo County

Santa Clara County

Merced County

Santa Cruz County

0 20

Miles

San Benito County

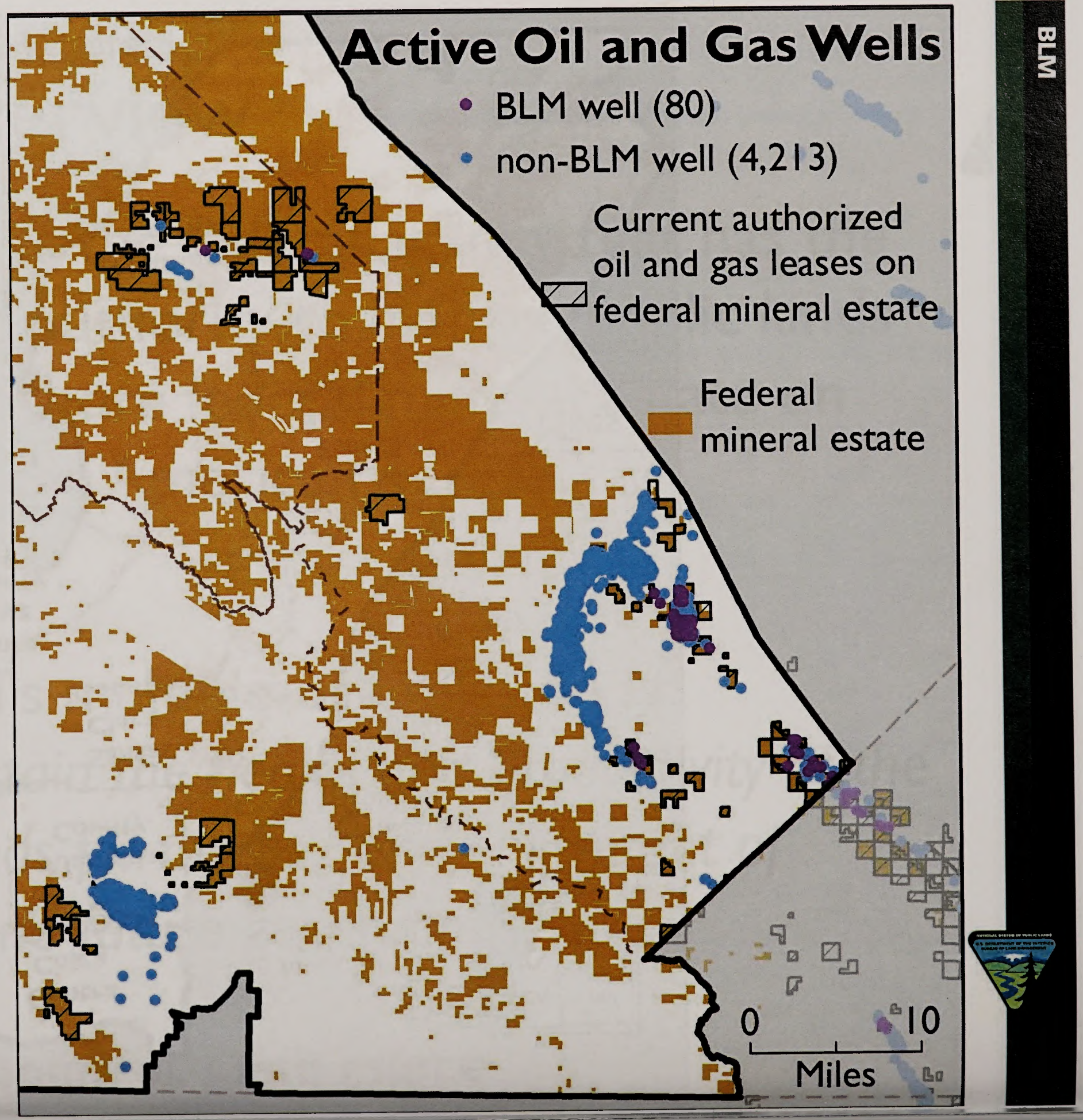
Fresno County

Monterey County

Federal mineral estate

BLM

Current Resource Conditions



What is a Resource Management Plan? (RMP)

- Primary tool guiding BLM management activities in support of the dual mandate of multiple use and sustained yield.
- Created and revised only through an EIS
  - Open, public process
  - Scoping is first step

BLM

Environmental Impact Statement (EIS) for RMP

- Will identify potential impacts that may result from implementing a proposed RMP
- Analyzes a variety of RMP alternatives
- Scoping is first phase of an EIS

BLM

Oil & Gas Decisions in RMPs

- Which lands are open or closed to leasing
- For open lands, which stipulations apply to protect certain kinds of resources
- RMPs do not authorize any actual drilling for exploration or development of oil and gas resources. Only leasing is authorized.

BLM

Workshop Objectives

Negar Vahidi, Aspen Environmental Group

– Purpose and Strategy

– Regional Social and Economic Facts/Statistics

– Questions?

BLM

Appendix C
Written Comments

Written Comments Submitted by Participant

Written Comments Submitted by the Monterey County Farm Bureau

Discussion Topics

The following questions are designed for all workshop participants to identify social and economic conditions and potential effects of the proposed RMP Amendment. Feedback from the workshop will be incoroprated into the EIS to help readers understand how public land resources are integrated into the local economy and way of life within the HFO.

1. What are the local economic goals and priorities in your region?

    a. Are they affected by local, regional, or global demand for oil and the price/barrel?

    b. Are they likely to be affected by development of federal minerals in the Hollister Field Office?

    c. Have local businesses seen a change in activity/revenue or employment levels related to oil and gas production?

2. Who is affected by oil and gas production in your geographic areas, and in what ways?

    a. If different groups are unequally affected, describe and explain why.

    b. Are there any pockets with vulnerable populations in the area?
    migrant low income farm workers + families
    rural poor

3. Identify existing community values that are potentially affected from the leasing and development of federal minerals in the HFO. high quality environment to retain and attract skilled pop.
rural character
quiet
dark skies (astronomy, growing cycles)
tourism - agri tourism, recreation

4. What strategies should BLM consider to promote safe and responsible oil and gas development?

    BLM Gold Book

5. Are there mitigation measures (e.g., constraints on site-specific activities) that could help offset the potential social and economic effects of BLM's land use planning decisions?
Consider socio-economic impact to life cycle of a lease up a boom bust economic sector, similar to timber in PNW, or multiple assets and capacity of region to diversify, retrain displaced workers and their families, e.g., working spouse.

FARM BUREAU
MONTEREY

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RECEIVED
U.S. DEPT. OF INTERIOR
BUREAU OF LAND MANAGEMENT
HOLLISTER, CA. 95023

December 30, 2014

Rick Cooper,
Field Office Manager
U.S. Bureau of Land Management
20 Hamilton Court
Hollister, CA 95023

RE: Social and Economic Workshop – February 4, 2015

Dear Mr. Cooper:

Monterey County Farm Bureau appreciates the notice of the workshop on enhanced well stimulation on federal minerals administered by the Bureau of Land Management. Due to other commitments, we are unable to attend this workshop as currently scheduled.

Monterey County Farm Bureau represents family farmers and ranchers in the interest of protecting and promoting agriculture throughout our County. We strive to improve the ability of those engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of our local resources.

Farmers and ranchers of Monterey County have enjoyed a long-standing partnership of cooperation with the oil and gas industry, starting in the mid-20th century. Production of oil in the San Ardo region of south Monterey County has provided opportunities for jobs, economic benefits, and conjunctive use of farm and range lands. Over these many decades, there have been no adverse incidents involving local oil production; the agricultural community of Monterey County appreciates the good neighbors that the oil and gas industry has become in the past 70+ years.

When the discussion of enhanced well stimulation in Monterey County is brought to the public, it can mean the consideration of steam injection processes currently in use by the oil producers around San Ardo, or the potential for hydraulic fracturing. While the former technique has been employed locally for many years, yielding benefits in the form of recycled water injected into our groundwater basin, the latter technique is not being considered for oil extraction in our County. Indeed, our understanding is that hydraulic fracturing is not possible in the geology of our oil fields here.

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We support the use of current oil extraction techniques in Monterey County that include enhanced well stimulation in the form of steam injection. This process recovers water along with the extracted oil from the well heads, separates the water into a purification system, which then results in either the reuse of the water in further well extractions or injection into the Salinas River Groundwater Basin. This process has been utilized for many years now and yields cleaner water quality than that of the aquifer itself. The groundwater basin benefits from the additional acre feet of surplus water that the oil producers cannot utilize in their extraction process.

Additionally, the oil and gas industry of Monterey County provides skilled jobs for local residents. This has been steady work for many years and several of the employees have been working the local oil fields for their entire career. This then translates into benefits for the community as paychecks are spent locally, contributing to a healthy economy. Towns like San Ardo, San Lucas, and King City have all benefited from employees who are working in the oil fields; all of these towns can be classified as having large minority populations, as they also have numerous residents who are employed by local agricultural producers and processors.

Agriculture in Monterey County represents a $4.38 billion annual sector of our economy and comprises the largest employment group of the County. Adding in all the related sectors of the economy, the impact is estimated at $9.2 billion annually. While oil and gas production does not approach this level of economic output, it is still an important element of our County's fiscal health. Because of the intertwined sectors and employment, the communities of south Monterey County are dependent on both healthy agricultural and oil production sectors.

We urge the Bureau of Land Management to consider the importance of oil and gas production to Monterey County residents and continue to support the enhanced well stimulation techniques currently employed locally. This should be extended to any federal lands in Monterey County where oil and gas production leases are being considered. Opportunities to enhance our communities through skilled employment and increased economic output will lead to greater prosperity, improving our future outlook for economic sustainability, and ultimately providing improvements to infrastructure.

Sincerely,

Norman C. Groot
Executive Director

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Appendix G

Federal Oil and Gas Operations on Split-Estate Lands

Appendix G.
Federal Oil and Gas Operations on Split-Estate Lands

1.0 Purpose

The purpose of this appendix is to summarize the BLM's procedures for considering proposals to conduct exploration and production operations on split-estate federal oil and gas leases. This Appendix is provided for information purposes only, and is not necessarily a complete statement of rights, obligations, or processes. This appendix is not a part of the BLM's land use plan decision for the RMP. Any conflict with any statute or regulation is unintentional. In the event of a conflict, the statute or regulation controls. Federal oil and gas lessees and operators, and private surface owners, are advised to confer with the BLM at the time an action is proposed for BLM's consideration, in order to obtain information about the current regulations and policies that may apply to the proposal. Nothing in this Appendix affects the authority of any Tribe or of the Bureau of Indian Affairs in any way. This RMP applies to Federal lands as defined by FLPMA, and does not apply to lands held in trust for any Tribe or for any individual Indian or Indians.

2.0 Definitions

Casual use (operations): "Casual use means activities involving practices that do not ordinarily lead to any appreciable disturbance or damage to lands, resources, or improvements. This term does not apply to private surface. Casual use includes surveying activities." (Onshore Oil and Gas Order No. 1, part II).

Lease: "means any contract, profitshare arrangement, joint venture or other agreement issued or approved by the United States under a mineral leasing law that authorizes exploration for, extraction of or removal of oil or gas." (Onshore Oil and Gas Order No. 1, part II).

Lease facility or *production facility*: "Production facilities means a lessee's or lease operator's pipes and equipment used on the leasehold to aid in extracting, processing, and storing oil and gas…" (64 FR 32140). See also BLM Manual Section 2880 ("Mineral Leasing Act Rights-of-Way") at Page 9.

Lease site: "means any lands, including the surface of a severed mineral estate, on which exploration for, or extraction and removal of, oil or gas is authorized under a lease." (43 CFR 3160.0-5).

Lessee: "means any person holding record title or owning operating rights in a lease issued or approved by the United States." (43 CFR 3160.0-5).

Operator: "means any person or entity including but not limited to the lessee or operating rights owner, who has stated in writing to the authorized officer that it is responsible under the terms and conditions of the lease for the operations conducted on the leased lands or a portion thereof." (43 CFR 3160.0-5).

Public lands: "means any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management…" (Federal Land Policy Management Act of 1976, Sec. 103(e)).

Private surface owner: "Private Surface Owner means a non- Federal or non-state owner of the surface estate and includes any Indian owner of surface estate not held in trust by the United States." (Onshore Oil and Gas Order No. 1, part II).

Split-estate: "Split Estate means lands where the surface is owned by an entity or person other than the owner of the Federal or Indian oil and gas." (Onshore Oil and Gas Order No. 1, part II). "When tribal lands are held in trust or are subject to Federal restrictions against alienation the BIA is the Surface Managing Agency, but if lands are held in unrestricted fee, those lands are treated the same as private surface." (Preamble to Onshore Oil and Gas Order No. 1 revisions, 72 FR 10322-10323, March 7, 2007).

Surface Managing Agency: "Surface Managing Agency means any Federal or state agency having jurisdiction over the surface overlying Federal or Indian oil and gas." (Onshore Oil and Gas Order No. 1, part II).

3.0 General

In considering and authorizing exploration and development of split-estate Federal oil and gas leases, the BLM prefers that the operator and split-estate surface owner reach a Surface Access Agreement for proposed oil and gas operations. The BLM coordinates with both the operator and surface owner, in accordance with the requirements of Onshore Oil and Gas Order No. 1, and generally provides the surface owner's lands the same level of resource (soil, water, vegetation, air, visual, cultural, etc.) protection as would be required on BLM-administered public lands.

"The BLM will offer the surface owner the same level of surface protection that the BLM provides on Federal surface. The BLM will not apply standards or conditions that exceed those that would normally be applied to Federal surface, even when requested by the surface owner." (The Gold Book, page 12).

Federal mineral lessees may enter onto a privately-owned surface to the extent necessary to explore and produce the Federal minerals in compliance with the relevant statutes and BLM regulations and land use designations. The BLM does not have the authority to regulate a surface owner's use of the surface estate, but does have the authority to regulate the activities of Federal mineral lessees and mining claimants. The BLM adds lease stipulations to split-estate Federal oil and gas leases, in order to ensure that leasing decisions conform to the approved Resource Management Plan (RMP) for the area.

4.0 Operations

4.1 Geophysical

The BLM's authority to permit geophysical operations is described under 43 CFR §3150.0-1:

> *Geophysical exploration on public lands, the surface of which is administered by the Bureau, requires Bureau approval. The procedures in this part also apply to geophysical exploration conducted under the rights granted by any Federal oil and gas lease unless the surface is administered by the U.S. Forest Service. However, a lessee may elect to conduct exploration operations outside the rights granted by the lease, in which case authorization from the surface managing agency or surface owner may be required... The procedures of this part do not apply to... operations conducted on private surface overlying public lands unless such operations are conducted by a lessee under the rights granted by the Federal oil and gas lease...*

As BLM Handbook H-3150-1[1] at pages 1-2 explains:

> *In those situations where Federal minerals are underlying private surface and the private surface owner's consent is obtained, the BLM is not to become involved. However, when landowner consent for access to the surface cannot be obtained for geophysical exploration operations on a Federal lease by the lease operator, the geophysical operation is to be authorized using the Sundry Notice process...*[2]
>
> *When the geophysical exploration operator is the Federal lessee or designated operator of the lessee, it is to file a Sundry Notice... with the BLM and provide notification to the surface owner by certified mail that it intends to enter onto the lands and conduct lease operations. The lessee/operator must then submit proof to the BLM authorized officer that the surface owner has been notified. The lessee or operator must also submit proof to the BLM authorized officer that it has a current and adequate bond payable to the United States for use by the surface owner for damages caused during exploration operations. The authorized officer must give the surface owner 30 days to comment on the proposed action before approving the Sundry Notice.*

When a surface access agreement is reached to conduct geophysical operations on split-estate lands with leased or unleased Federal oil and gas, the BLM does not become involved.

The BLM will not accept a Notice of Intent to Conduct Geophysical Operations (NOI), BLM Form 3150-4) or bond to permit entry to split-estate lands with unleased Federal oil and gas,

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[1] Onshore Oil and Gas Geophysical Exploration Surface Management Requirements. January 9, 2007.

[2] In BLM Washington Office Instruction Memorandum (IM) 2009-121, "Approval of Notice of Intent to Conduct Geophysical Exploration to Federal Oil and Gas Lessee on Split Estate", dated May 8, 2009, the BLM recognized that the Sundry Notice form (BLM Form 3160-5) is an imperfect form to use for permitting of geophysical operations. This policy clarified that the BLM will "no longer require the lessee or its operator to file a Sundry Notice" for the purpose of proposing entry to Federal leases where a surface owner denies access to the lessee or its operator. In its place the BLM would use the NOI form (BLM Form 3150-4).

since the BLM has not issued an oil and gas lease to allow for operations under 43 CFR Part 3160 (see 43 CFR 3150.0-1).

In order to conduct geophysical operations on split-estate lands where a Federal oil and gas lease has been issued and where an agreement with the surface owner has not been reached, the lessee or the operator must first obtain BLM authorization through an NOI that proposes entry to those lands in order to conduct geophysical operations. The lessee or designated operator must provide to the BLM a certification (see Attachment 1) that a good-faith effort was made to: (a) notify the landowner prior to entry; (b) obtain a Surface Access Agreement; and (c) deliver a copy of the proposed NOI to the surface owner.[3] The NOI must also identify the surface owner and include the owner's name, address, and telephone number, if known. A good and sufficient bond to secure payment of applicable damages for the use and benefit of the surface owner must be provided to the BLM on BLM Form 3160-19. The lessee or designated operator must also submit to the BLM evidence of service of a copy of the bond upon the surface owner. Prior to authorizing the NOI proposing entry to the lands for which the bond has been submitted, the BLM notifies the surface owner and provides a 30-day period during which the surface owner may protest the sufficiency of the bond. If the sufficiency of the bond is protested, the BLM reviews the bond amount and determines if it is adequate. That decision by the BLM is subject to State Director Review (SDR) upon a request by any adversely affected party and the State Director's decision is subject to appeal to the Interior Board of Land Appeals (IBLA).[4]

4.2 Notice of Staking/Application for Permit to Drill

4.2.1 Surveying and Staking Activities

The lessee or operator is encouraged to contact the surface owner of split-estate lands early in the process of planning for exploration and development of a Federal lease. This facilitates early discussion about the goals and objectives of both the surface owner and operator. Communication between the lessee or operator and surface owner can reduce potential conflicts, thereby reducing misunderstandings and permit processing times.

For surveying and staking activities, "[t]he operator is responsible for making access arrangements with the appropriate Surface Managing Agency (other than the BLM and the FS) or private surface owner." (Onshore Oil and Gas Order No. 1, part III.D.2.a).

"No entry on split estate lands for surveying and staking should occur without the operator first making a good faith effort to notify the surface owner. Also, operators are encouraged to notify the BLM or the FS, as appropriate, before entering private lands to stake for Federal mineral estate locations." (Onshore Oil and Gas Order No. 1, part III.D.2.b).

Aside from surveying and staking the proposed well location, road, pipeline, and/or other lease facilities, the operator may also be required to conduct resource condition surveys of the leased lands.

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[3] See Onshore Oil and Gas Order No. 1, Part VI.
[4] See 43 CFR §3165.3(b). *See, e.g., William P. Maycock*, 176 IBLA 206 (2008).

"As provided in the oil and gas lease, the BLM may request that the applicant conduct surveys or otherwise provide information needed for the BLM's National Historic Preservation Act consultation with the State Historic Preservation Officer or Indian tribe or its Endangered Species Act consultation with the relevant fisheries agency. The Federal mineral lessee has the right to enter the property for this purpose, since it is a necessary prerequisite to development of the dominant mineral estate. Nevertheless, the lessee or operator should seek to reach agreement with the surface owner about the time and method by which any survey would be conducted." (Onshore Oil and Gas Order No. 1, part VI).

4.2.2 Onsite Inspection(s)

On split-estate lands, the onsite inspection provides the opportunity for the BLM, operator, and surface owner to evaluate and discuss the proposed well location or lease facility in the field.

"Within 10 days of receiving the application, the BLM, in coordination with the operator and Surface Managing Agency, including the private surface owner in the case of split estate minerals, will schedule a date for the onsite inspection (unless the onsite inspection has already been conducted as part of a Notice of Staking)." (Onshore Oil and Gas Order No. 1, part III.E.2.a).

"On non-NFS lands, the BLM will invite the Surface Managing Agency and private surface owner, if applicable, to participate in the onsite inspection. If the surface is privately owned, the operator must furnish to the BLM the name, address, and telephone number of the surface owner if known." (Onshore Oil and Gas Order No. 1, part III.C).

At the onsite inspection, the BLM will consider applicable Best Management Practices (BMPs) that would avoid or mitigate environmental impacts to natural resources. The onsite inspection provides the surface owner with the opportunity to review the proposed well location and/or lease facilities; provide information to the BLM and operator about resources, improvements, and land uses; and express preferences for BMPs to be used for lease operations.

"All parties who attend the onsite inspection will jointly develop a list of resource concerns that the operator must address in the APD. The operator will be provided a list of these concerns either during the onsite inspection or within 7 days of the onsite inspection. Surface owner concerns will be considered to the extent practical within the law." (Onshore Oil and Gas Order No. 1, part III.C).

"The BLM will invite the surface owner to the onsite inspection to assure that their concerns are considered." (Onshore Oil and Gas Order No. 1, part VI).

4.2.3 Required Components of a Complete APD for Split-Estate Operations

4.2.3.1 Description of Surface Ownership

A description of the surface ownership (with name, address, and telephone number, if known) along with a certification must be included in the APD submitted by the operator to the BLM.

"The operator must indicate (in a narrative) the surface ownership at the well location, and of all lands crossed by roads that the operator plans to construct or upgrade, including, if known, the name of the agency or owner, phone number, and address. The operator must certify that they have provided a copy of the Surface Use Plan of Operations required in this section to the private surface owner of the well site location, if applicable, or that they made a good faith effort if unable to provide the document to the surface owner." (Onshore Oil and Gas Order No. 1, part III.D.4.k).

4.2.3.2 Surface Access Agreement or Waiver

For operations on leased split-estate lands, the operator must undertake a good faith effort to reach a Surface Access Agreement.

"[I]n the case of actual oil and gas operations, the operator must make a good faith effort to notify the private surface owner before entry and make a good faith effort to obtain a Surface Access Agreement from the surface owner… The Surface Access Agreement may include terms or conditions of use, be a waiver, or an agreement for compensation. The operator must certify to the BLM that: (1) It made a good faith effort to notify the surface owner before entry; and (2) That an agreement with the surface owner has been reached or that a good faith effort to reach an agreement failed." (Onshore Oil and Gas Order No. 1, part VI).

"The operator must make a good faith effort to provide a copy of their Surface Use Plan of Operations to the surface owner." (Onshore Oil and Gas Order No. 1, part VI). The operator must also provide a copy of any revisions to the SUPO to the surface owner. If required under Onshore Oil and Gas Order No. 6 ("Hydrogen Sulfide Operations"), the BLM requires the operator to provide a copy of the Public Protection Plan to the surface owner.

"The surface use agreement between the surface owner and the operator is confidential. However, the APD Surface Use Plan of Operations must contain sufficient detail about any aspects of the agreement necessary for NEPA documentation and to determine that the operations will be in compliance with laws, regulations, Onshore Orders, and agency policies." (The Gold Book, page 12).

"If the BLM's requirements conflict with provisions in the Surface [Access] Agreement, the operator or surface owner should disclose that conflict at the onsite or to the BLM in writing, and the BLM should consider those conflicts in making its final decision." (BLM's Split Estate Report to Congress at page 15). Thus, to the extent terms of the agreement may conflict with Conditions of Approval, or COAs, to the APD, the BLM should be made aware of those terms, so that they can be considered in the BLM's final decision.

"The BLM does not review the Surface Use Agreement and does not enforce portions of the Surface Use Agreement that are not contained within the approved APD." (BLM's Split Estate Report to Congress at page 17).

4.2.3.3 Bonding In Lieu of a Surface Access Agreement or Waiver

It is the preference of the BLM that the operator and surface owner reach a Surface Access Agreement. However, in those cases where an agreement is not reached, the BLM follows the procedural requirements in the BLM's regulations and policies. A good and sufficient bond to secure payment of applicable damages for the use and benefit of the surface owner must be provided to the BLM on BLM Form 3160-19. The lessee or designated operator must also submit to the BLM evidence of service of a copy of the bond upon the surface owner. Prior to authorizing the APD proposing entry to the lands for which the bond has been submitted, the BLM notifies the surface owner and provides a 30-day period during which the surface owner may protest the sufficiency of the bond. If the sufficiency of the bond is protested, the BLM reviews the bond amount and determine if it is adequate. That decision by the BLM is subject to State Director Review (SDR) upon a request by any adversely affected party and the State Director's decision is subject to appeal to the Interior Board of Land Appeals (IBLA).[5]

"If no agreement was reached with the surface owner, the operator must submit an adequate bond (minimum of $1,000) to the BLM for the benefit of the surface owner sufficient to: (1) Pay for loss or damages; or (2) As otherwise required by the specific statutory authority under which the surface was patented and the terms of the lease. Surface owners have the right to appeal the sufficiency of the bond. Before the approval of the APD, the BLM will make a good faith effort to contact the surface owner to assure that they understand their rights to appeal." (Onshore Oil and Gas Order No. 1, part VI).

"The bond amount will be reviewed by the BLM to assure that it is sufficient based on the appropriate law." (Preamble to Onshore Oil and Gas Order No. 1 revisions, 72 FR 10323, March 7, 2007).

If operations under an approved APD result in loss or damages that are compensable under the statutes by which the lands were patented, the surface owner may obtain judgment from a court of competent jurisdiction. The BLM will then release from the bond the amount ordered by the court to the surface owner.

4.2.4 Approval of the APD

The BLM considers the views of the surface owner before approving the APD. The BLM must prepare an environmental record of review (43 CFR 3162.5-1(a)) to document its evaluation of potential resource impacts, including documentation of NEPA compliance.

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[5] See 43 CFR §3165.3(b). *See, e.g., William P. Maycock,* 176 IBLA 206 (2008).

"The BLM must comply with NEPA, the National Historic Preservation Act, the Endangered Species Act, and related Federal statutes when authorizing lease operations on split estate lands where the surface is not Federally owned and the oil and gas is Federal. For split estate lands within FS administrative boundaries, the BLM has the lead responsibility, unless there is a local BLM/FS agreement that gives the FS this responsibility." (Onshore Oil and Gas Order No. 1, part VI).

"After the APD is approved the operator must make a good faith effort to provide a copy of the Conditions of Approval to the surface owner. The APD approval is not contingent upon delivery of a copy of the Conditions of Approval to the surface owner." (Onshore Oil and Gas Order No. 1, part VI).

4.3 Sundry Notices

Operations proposed by Sundry Notice that will result in additional surface disturbance or re-disturbance of previously reclaimed areas require a Surface Use Plan of Operations.

"Prior to commencing any operation on the leasehold which will result in additional surface disturbance, other than those authorized under § 3162.3–1 or § 3162.3–2 of this title, the operator shall submit a proposal on Form 3160–5 to the authorized officer for approval. The proposal shall include a surface use plan of operations." (43 CFR 3162.3-3).

"The operator must certify on Form 3160–5 that they have made a good faith effort to provide a copy of any proposal involving new surface disturbance to the private surface owner in the case of split estate." (Onshore Oil and Gas Order No. 1, part VIII.A).

For review of Final Abandonment Notices (FANs) submitted by an operator on split-estate lands, the BLM will consider the views of the surface owner.

"If applicable, the private surface owner will be notified and their views will be carefully considered." (Onshore Oil and Gas Order No. 1, part XII).

"In cases where the Surface Managing Agency or private surface owner desires to acquire an oil and gas well and convert it to a water supply well or acquire a water supply well that was drilled by the operator to support lease operations, the Surface Managing Agency or private surface owner must inform the appropriate BLM office of its intent before the approval of the APD in the case of a dry hole and no later than the time a Notice of Intent to Abandon is submitted for a depleted production well… The Surface Managing Agency or private surface owner must reach agreement with the operator as to the satisfactory completion of reclamation operations before the BLM will approve any abandonment or reclamation. The BLM approval of the partial abandonment under this section, completion of any required reclamation operations, and the signed release agreement will relieve the operator of further obligation for the well. If the Surface Managing Agency or private surface owner acquires the well for water use purposes, the party acquiring the well assumes liability for the well." (Onshore Oil and Gas Order No. 1, part IX.B).

"Completion of a well as plugged and abandoned may also include conditioning the well as water supply source for lease operations or for use by the surface owner or appropriate Government Agency, when authorized by the authorized officer. All costs over and above the normal plugging and abandonment expense will be paid by the party accepting the water well." (43 CFR 3162.3-4(b)).

4.4 Emergency Operations

"In the event of an emergency, the operator may take immediate action without prior Surface Managing Agency approval to safeguard life or to prevent significant environmental degradation. The BLM or the FS must receive notification of the emergency situation and the remedial action taken by the operator as soon as possible, but not later than 24 hours after the emergency occurred. If the emergency only affected drilling operations and had no surface impacts, only the BLM must be notified. If the emergency involved surface resources on other Surface Managing Agency lands, the operator should also notify the Surface Managing Agency and private surface owner within 24 hours." (Onshore Oil and Gas Order No. 1, part IV.d).

5.0 References

- Onshore Oil and Gas Order No. 1
- Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development ("The Gold Book")
- 43 CFR Part 3150
- 43 CFR Part 3160
- 43 CFR Subpart 3814
- BLM Wyoming – Wyoming Oil and Gas Conservation Commission Memorandum of Understanding
- BLM Handbook H-3150-1 (Geophysical Handbook)
- BLM Form 3160-019 ("Bond For Surface Owner Protection")
- BLM Brochure: Split Estate – Rights, Responsibilities, and Opportunities
- BLM Brochure: Split Estate – Cultural Resource Requirements on Private Surface – Federal Minerals for Oil and Gas Development
- BLM-Washington Office Instruction Memorandum 2003-131 ("Permitting Oil and Gas on Split Estate Lands and Guidance for Onshore Oil and Gas Order No. 1"), April 2, 2003.
- BLM-Washington Office Instruction Memorandum 2007-165 ("Split Estate Report to Congress – Implementation of Fluid Mineral Leasing and Land Use Planning Recommendations"), July 26, 2007.
- Energy Policy Act of 2005, Section. 1835 ("Split-Estate Federal Oil and Gas Leasing and Development Practices").
- Energy Policy Act of 2005 – Section 1835 – A Report to Congress (December 2006).
- BLM-Washington Office Instruction Memorandum 1989-201 ("Legal Responsibilities of BLM for Oil and Gas Leasing and Operations on Split Estate Lands"), January 4, 1989.